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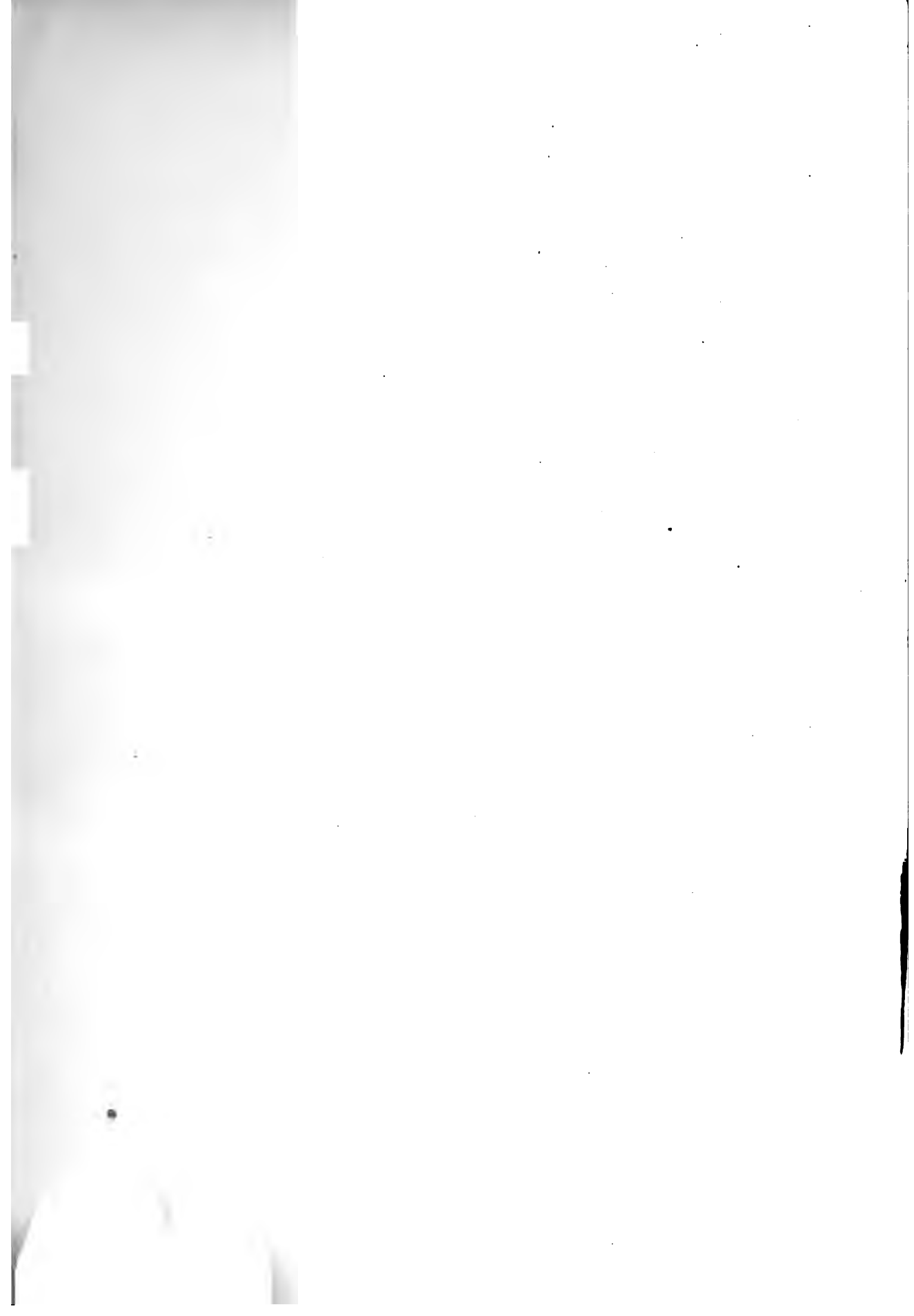


British  
Columbia  
Mines Dept.









# ANNUAL REPORT

OF THE

# ★ <sup>17</sup>MINISTER OF MINES

FOR THE

YEAR ENDING 31st DECEMBER,

1897,

BEING AN ACCOUNT OF

MINING OPERATIONS FOR GOLD, COAL, ETC.,

IN THE

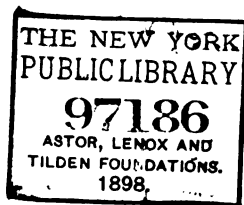
PROVINCE OF BRITISH COLUMBIA.



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VICTORIA, B. C. :

Printed by RICHARD WOLFENDEN, Printer to the Queen's Most Excellent Majesty.  
1898.



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YRABU

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REPORT  
OF THE  
MINISTER OF MINES,  
1897.

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—o—

*To His Honour* THOMAS R. McINNES,  
*Lieutenant-Governor of the Province of British Columbia.*

MAY IT PLEASE YOUR HONOUR:

The Annual Report of the Mining Industries of the Province for the year 1897  
is herewith respectfully submitted.

JAMES BAKER,

*Minister of Mines.*

*Minister of Mines' Office,*

*20th February, 1898.*



MOVIE  
STILL  
VIAZEL

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# REPORTS

—BY—

WILLIAM A. CARLYLE, PROVINCIAL MINERALOGIST.

—o—

*To the Hon. James Baker,  
Minister of Mines.*

SIR,—I have the honour to submit the following tables of the mineral production of the mines of British Columbia; and also reports on the different mining districts in the Province.

In compiling the statistical statement for 1897, I have been greatly aided by the clauses in the "Inspection of Metalliferous Mines Act, 1897," that make it now obligatory for mine-owners to send in a detailed statement of the production for the year by the fifteenth of January, as I am now able to present almost perfect returns for the year ending December 31st.

From later and more correct information not available when preparing the report for 1896, some alterations have had to be made in the tables given in that report, so that it is believed that the following tables will be found as correct as it is possible to have them, and to be very nearly exact.

Henceforth, by means of the Act above mentioned, it should be possible to give very satisfactory and full returns for each year.

I have the honour to be,

Sir,

Your obedient Servant,

WILLIAM A. CARLYLE,

*Provincial Mineralogist.*

*Victoria, B. C., February 15th, 1898.*

## MINERAL PRODUCTION OF BRITISH COLUMBIA.

—:O:—

### METHOD OF COLLECTING RETURNS.

In the following tables the method followed in assembling the out-put of the lode mines is to take the mill and smelter returns *received during the year*. The smelter returns for ore shipped in December are often not received until February or later, and as this report has to be in press by then, it has been thought most expedient to follow the above plan, or to take the returns for ore *paid for*, or realized upon, during the year.

TABLE I.

TOTAL PRODUCTION FOR ALL YEARS UP TO 1898.

Gold, placer .....	\$ 59,317,473
Gold, lode .....	4,300,689
Silver .....	7,301,060
Lead .....	2,971,618
Copper .....	521,060
Coal and Coke .....	36,626,585
Building stone, bricks, &c .....	1,350,000
Other metals .....	25,000
Total .....	\$112,413,485

The following table shows the steady rate of increase during the past seven years, and of the marked increase during the past year of 1897. As stated before, the influence of lode mining begins to be felt in the year 1892, since when the rate of increase has been entirely due to the production of the metalliferous mines, as the out-put of the collieries has not increased.

TABLE II.

PRODUCTION FOR EACH YEAR FROM 1890 TO 1897 (INCLUSIVE).

Year.	Amount.	Yearly increase.
1890 .....	\$ 2,608,803 .....	
1891 .....	3,521,102 .....	35 %
1892 .....	2,978,530 .....	
1893 .....	3,588,413 .....	21 %
1894 .....	4,225,717 .....	18 %
1895 .....	5,643,042 .....	33 %
1896 .....	7,507,956 .....	34 %
1897 .....	10,455,268 .....	40 %

Table III. gives a statement in detail of the amount and value of the different mine products for the years 1896 and 1897. As it has yet been impossible to collect the statistics regarding building stone, lime, bricks, tiles, etc., these are estimated for 1897, but not estimated for or included in the output for 1896.

However, although 1896 showed a very decided increase over 1895, 1897 shows a still greater advance in the production of *gold, silver, lead and copper.*

TABLE III.

## AMOUNT AND VALUE OF MATERIALS PRODUCED 1896 AND 1897.

	Customary Measures.	1896.		1897.	
		Quantity.	Value.	Quantity.	Value.
Gold, placer.....	Ounces .....	27,201	\$ 544,026	25,676	\$ 513,520
" lode .....	" .....	62,259	1,244,180	106,141	2,122,820
Silver.....	" .....	3,135,343	2,100,689	5,472,971	3,272,836
Copper.....	Pounds .....	3,818,556	190,926	5,325,180	266,258
Lead .....	" .....	24,199,977	721,384	38,841,135	1,390,517
Coal .....	Tons, 2240 lbs	894,882	2,688,666	882,854	2,648,562
Coke.....	" .....	615	3,075	17,832	89,155
Other materials .....	.....	.....	15,000	.....	151,600
			\$7,507,946		\$10,455,268

TABLE IV.

## PRODUCTION OF METALS PER DISTRICT AND DIVISION.

NAME.	DIVISIONS.		DISTRICTS.	
	1896.	1897.	1896.	1897.
CARIBOO .....			\$ 384,050	\$ 325,000
Barkerville Division .....	\$ 82,900	\$ 65,000		
Lightning Creek " .....	53,000	25,000		
Quesnellemouth " .....	51,100	35,000		
Keithley Creek " .....	197,050	200,000		
CASSIAR .....			*21,000	37,060
KOOTENAY, EAST .....			154,427	163,796
KOOTENAY, WEST .....			4,002,735	6,765,703
Ainsworth Division .....	345,626	440,545		
Nelson " .....	545,529	789,215		
Slocan " .....	1,854,011	3,280,686		
Trail Creek " .....	1,243,360	2,097,280		
Other parts .....	14,209	157,977		
LILLOOET .....			33,665	39,840
YALE .....			206,078	226,762
Osoyoos .....	131,220	142,982		
Similkameen .....	9,000	25,100		
Yale .....	65,108	58,680		
OTHER DISTRICTS .....			15,000	9,390
			\$4,816,955	\$7,567,551

\*For Cassiar, the production of \$25,000 in 1896 from Omineca was lately reported.

For more detailed statements see report on Slocan and Trail Creek Division.

## PLACER GOLD.

Table V. continues the yearly production of placer gold to date, as determined by the returns sent in by the banks and express companies of gold transmitted by them to the mints, and from returns sent in by the Gold Commissioners and Mining Recorders. To these yearly amounts one-third was added up to the year 1878, and from then to 1895, one-fifth, which proportions were considered to represent, approximately, the amount of gold sold of which there was no record.

The gold out-put for 1897 shows no advance over 1896. This placer gold contains from 10 to 25 per cent. silver, but the silver value has not been separated from the totals as it would be insignificant.

TABLE V.

## YIELD OF PLACER GOLD PER YEAR TO DATE.

1858 .....	\$ 705,000	1878 .....	\$1,275,204
1859 .....	1,615,070	1879 .....	1,290,058
1860 .....	2,228,543	1880 .....	1,013,827
1861 .....	2,666,118	1881 .....	1,046,737
1862 .....	2,656,903	1882 .....	954,085
1863 .....	3,913,563	1883 .....	794,252
1864 .....	3,735,850	1884 .....	736,165
1865 .....	3,491,205	1885 .....	713,738
1866 .....	2,662,106	1886 .....	903,651
1867 .....	2,480,868	1887 .....	693,709
1868 .....	3,372,972	1888 .....	616,731
1869 .....	1,774,978	1889 .....	588,923
1870 .....	1,336,956	1890 .....	490,435
1871 .....	1,799,440	1891 .....	429,811
1872 .....	1,610,972	1892 .....	399,526
1873 .....	1,305,749	1893 .....	356,131
1874 .....	1,844,618	1894 .....	405,516
1875 .....	2,474,004	1895 .....	481,683
1876 .....	1,786,648	1896 .....	544,026
1877 .....	1,608,182	1897 .....	513,520
Total .....		\$59,317,473	

TABLE VI.

Since last report further information has been secured that has modified in some details this table as it then appeared, more especially in reference to the production of lead. This information of production in the earlier years is obtained from the "Mineral Statistics and Mines for 1896," Geological Survey of Canada.

## PRODUCTION OF LODGE MINES.

YEAR.	GOLD.		SILVER.		LEAD.		COPPER.		TOTAL VALUES.
	Oz.	Value.	Oz.	Value.	Pounds.	Value.	Pounds.	Value.	
		\$		\$		\$		\$	\$
1887 .....			17,690	17,331	204,800	9,216			26,547
1888 .....			79,780	75,000	674,500	29,813			104,813
1889 .....			53,192	47,873	165,100	6,498			54,371
1890 .....			70,427	73,948	<i>Nil.</i>	<i>Nil.</i>			73,948
1891 .....			4,500	4,000	<i>Nil.</i>	<i>Nil.</i>			4,000
1892 .....			77,160	66,935	808,420	33,064			99,999
1893 .....	1,170	23,404	227,000	195,000	2,135,023	78,996			297,400
1894 .....	6,252	125,014	746,379	470,219	5,662,523	169,875	324,680	16,234	781,342
1895 .....	39,264	785,271	1,496,522	977,229	16,475,464	532,255	952,840	47,642	2,342,397
1896 .....	62,259	1,244,180	3,135,343	2,100,689	24,199,977	721,384	3,318,556	190,926	4,257,179
1897 .....	106,141	2,122,820	5,472,971	3,272,836	38,841,135	1,390,517	5,325,180	266,258	7,052,431
	215,086	\$4,300,689	11,380,964	\$7,301,060	89,166,942	\$2,971,618	10,421,256	\$521,060	\$15,094,427

See reports from Slocan and Trail Creek Divisions for more detailed statements.

TABLE VII.  
COAL AND COKE PRODUCTION PER YEAR TO DATE.

Coal.		
YEARS.	TONS (2,240 lbs.)	VALUE.
1836-52.....	10,000.....	\$ 40,000
1852-59.....	25,396.....	101,592
1859 (2 months).....	1,989.....	7,956
1860.....	14,246.....	56,988
1861.....	13,774.....	55,096
1862.....	18,118.....	72,472
1863.....	21,345.....	85,380
1864.....	28,632.....	115,528
1865.....	32,819.....	131,276
1866.....	25,115.....	100,460
1867.....	31,239.....	124,956
1868.....	44,005.....	176,020
1869.....	25,802.....	143,208
1870.....	29,843.....	119,372
1871-2-3.....	148,549.....	493,836
1874.....	81,547.....	244,641
1875.....	110,145.....	330,435
1876.....	139,192.....	417,576
1877.....	154,052.....	462,156
1878.....	170,846.....	512,538
1879.....	241,301.....	723,903
1880.....	267,595.....	802,785
1881.....	228,357.....	685,071
1882.....	282,139.....	846,417
1883.....	213,299.....	639,897
1884.....	394,070.....	1,182,210
1885.....	265,596.....	796,788
1886.....	326,636.....	979,908
1887.....	413,360.....	1,240,080
1888.....	489,301.....	1,467,903
1889.....	579,830.....	1,739,490
1890.....	678,140.....	2,034,420
1891.....	1,029,097.....	3,087,291
1892.....	826,335.....	2,479,005
1893.....	978,294.....	2,934,882
1894.....	1,012,953.....	3,038,859
1895.....	939,654.....	2,818,962
1896.....	896,222.....	2,688,666
1897.....	882,854.....	2,648,562
Total.....	12,081,687 tons.	\$36,626,585
Coke.		
1895-6.....	1,565.....	7,825
1897.....	17,831.....	89,155
	19,396 tons.	\$96,980

The above table shows little change during the past year in the coal production, but a decided increase in the out-put of coke, of which the bulk has been shipped to the Kootenay smelters. All of this coke came from the coke ovens at Comox, Vancouver Island.

A new and important market for this coke is now opening in Mexico, where one ship-load has already been sent to one of the large smelting works situated not far from the coast.



TABLE VIII.

## PRODUCTION IN DETAIL OF THE METALLIFEROUS

DISTRICT.	YEAR.	TONS.	GOLD—PLACER.		GOLD—LODE.	
			Ounces.	Value.	Ounces.	Value.
				\$		\$
CARIBOO .....						
Barkerville Division .....	1896		4,145	82,900		
	1897		3,250	65,000		
Lightning Creek " .....	1896		2,650	53,000		
	1897		1,250	25,000		
Quesnelmouth " .....	1896		2,555	51,100		
	1897		1,750	35,000		
Quesnelle Forks, Keithley Creek Division .....	1896		9,853	197,650		
	1897		10,000	200,000		
CASSIAR .....	1896		1,050	21,000		
	1897		1,853	37,060		
KOOTENAY, EAST .....	1896		1,054	21,076		
	1897	2,497	* 600	12,000		
KOOTENAY, WEST .....						
Ainsworth Division .....	1896					
	1897	5,556				
Nelson " .....	1896	30,160	275	5,500	236	4,720
	1897	50,014			2,076	41,520
Slocan " .....	1896	16,560			152	3,040
	1897	33,567			193	3,860
Trail Creek " .....	1896	38,075			55,275	1,104,500
	1897	68,804			97,024	1,940,480
Other " .....	1896	59	231	4,627	35	700
	1897	1,781	300	6,000	9	180
LILLOOET .....	1896		1,683	33,665		
	1897	755	1,874	37,480	118	2,360
YALE .....						
Osoyoos Division .....	1896				6,561	131,220
	1897	6,098	440	8,800	6,674	133,480
† Similkameen " .....	1896		450	9,000		
	1897		1,175	23,500		
Yale " .....	1896		3,255	65,108		
	1897		2,984	58,680		
OTHER DISTRICTS .....	1897	290	250	5,000	47	940
‡ Building stone, bricks, etc. ....	1897					
TOTALS .....	1896		27,201	\$544,026	62,259	\$1,244,180
	1897	169,362	25,676	\$513,520	106,141	\$2,122,820

\* No returns of placer gold.

† Yield of platinum for 1897, \$1,600.

## MINES FOR 1896 AND 1897.

SILVER.		COPPER.		LEAD.		TOTALS FOR DIVISIONS.		TOTALS FOR DISTRICTS.	
Ounces.	Value.	Pounds.	Value.	Pounds.	Value.	1896	1897	1896	1897
	\$		\$		\$	\$	\$	\$	\$
.....	.....	.....	.....	.....	.....	.....	.....	384,050	325,000
.....	.....	.....	.....	.....	.....	82,900	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	65,000	.....	.....
.....	.....	.....	.....	.....	.....	53,000	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	25,000	.....	.....
.....	.....	.....	.....	.....	.....	51,100	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	35,000	.....	.....
.....	.....	.....	.....	.....	.....	197,060	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	200,000	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	21,000	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	37,060
73,796	49,443	.....	.....	2,806,411	83,908	.....	.....	154,427	.....
116,657	69,760	.....	.....	2,291,451	82,036	.....	.....	.....	163,796
.....	.....	.....	.....	.....	.....	.....	.....	4,002,735	6,765,703
374,097	250,665	.....	.....	3,186,592	94,961	345,626	.....	.....	.....
524,578	313,697	.....	.....	3,543,237	126,848	.....	440,545	.....	.....
631,900	423,413	2,237,921	111,896	.....	.....	545,529	.....	.....	.....
961,124	574,752	3,453,644	172,682	7,291	261	.....	789,215	.....	.....
1,954,258	1,309,353	.....	.....	18,175,074	541,618	1,854,011	.....	.....	.....
3,641,287	2,177,490	.....	.....	30,707,705	1,099,336	.....	3,280,686	.....	.....
89,285	59,830	1,580,635	79,030	.....	.....	1,243,360	.....	.....	.....
110,068	65,821	1,819,586	90,979	.....	.....	.....	2,097,280	.....	.....
11,917	7,985	.....	.....	29,900	897	14,209	.....	.....	.....
116,657	69,761	.....	.....	2,291,451	82,036	.....	157,977	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	83,665	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	39,840
.....	.....	.....	.....	.....	.....	.....	.....	206,078	226,762
.....	.....	.....	.....	.....	.....	131,220	.....	.....	.....
1,174	702	.....	.....	.....	.....	.....	142,982	.....	.....
.....	.....	.....	.....	.....	.....	9,000	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	25,100	.....	.....
.....	.....	.....	.....	.....	.....	65,108	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	58,680	.....	.....
1,426	863	51,950	2,597	.....	.....	.....	.....	.....	9,390
.....	.....	.....	.....	.....	.....	.....	.....	.....	150,000
3,135,343	\$2,100,689	3,518,556	\$190,926	24,199,977	\$ 721,384	.....	.....	\$4,801,955	.....
5,472,971	\$3,272,836	5,325,180	\$266,258	38,841,135	\$1,390,517	.....	\$7,317,465	.....	\$7,717,551

‡ Estimated.

## THE PROGRESS OF MINING.

Figures speak for themselves, and the statistical tables just given show very clearly the steady but gratifying growth of the mining industry in this Province.

The results are so far not startling or phenomenal, but the increase of the out-put of the lode mines from \$100,000 in 1892 to \$7,050,000 in 1897, or five years, with an increase of \$2,750,000, or 65%, during the past year, commands attention.

That 1898 will see a substantial increase is now assured from the amount of ore now in sight in the different districts, and from the fact that the amount of customs returns for shipments of ore for January, 1898, were \$1,193,458 as compared with \$675,506 in 1897 (these shipments from West Kootenay only).

The increase in the amount of gold (lode) was 43,882 ounces, or 70 %;  
**Increases.** of silver, 2,337,682 ounces, or 75 %; of lead, 14,641,158 pounds, or 65 %;  
 of copper, 1,506,624 pounds, or 40 %.

### CAPITAL.

The interest of capital in the mineral resources of the Province has been aroused to a degree quite commensurate with what the mining regions are now prepared to show or offer, and in Great Britain a large amount of money is now ready to be sent here, provided good, business-like propositions can be presented. Not only are gold properties now greatly in demand, but also silver and copper, as the money-making possibilities of the high grade silver ores, as found in the Slocan, Ainsworth and other camps, are acknowledged by investors, but often ignored by speculators, who wish to cater to the public's taste for gold.

Such interest has been aroused that any district or property that can offer good inducements to investment will be examined and favourably considered, and when such a condition of affairs is reached, it then remains with the mining men to open up and prepare their claims for inspection.

### MINING COMPANIES.

During the early part of the year, pending the enactment of the new Company's Act with more stringent regulations, a great many mining companies were registered with a capitalization that savoured of the ridiculous, but the payment of \$50 or \$100 for the licence on July 1st was more than a great many of these companies could stand, and they ceased to exist.

A good many companies, organized solely to make money by the sale of stock, as the public was then worked up to such a pitch as to be willing to buy almost anything offered, have suspended with no assets, as they never possessed anything except bonds or options on property or unworked locations.

However, strong companies, and the number is increasing, have been purchasing both "prospects" and developed properties or mines, and mining operations are becoming more extensive, and more thorough and substantial work is being done.

For the public in buying mining stocks, it must be very difficult to decide what to choose. In many cases a company is judged by the personnel of its directorate, by no means a sure and safe way, or else by the most tempting offerings in the prospectus of large and speedy dividends, according to the high values in large bodies of ore stated to exist on the properties of the company. The public buys this stock either with the hope of selling out on a rise, so many times engendered by skilful machinations, or for investment, and the offers of a company, if very brilliant and enticing, can often be correctly judged by the query that if these mines are so rich as claimed, why do the promoters wish to divide up such a good thing with anyone who will buy the stock.

To the public at large it may be well to state in reference to the mining resources of this Province, that they now promise to become yearly more valuable, that British Columbia can now claim a place among the mining countries of the world, and that with favourable climatic and natural conditions, excellent laws and good government, and rapidly extending means of transportation and cheaper treatment of ores, many opportunities for the careful and proper

investment of money are now here afforded. But it is also to be remembered that this is no longer a terra incognita, that there are many here already closely watching for and prepared to purchase any good claims that may be discovered, and that it is quite absurd to suppose that any one, probably totally ignorant of mining affairs, can come here and in a few weeks pick up properties with phenomenally rich showings, as has been claimed by some who have come, bought and gone back to float companies by means of most specious prospectuses.

There are many good properties that, from surface indications and scanty development, promise favourably, but it is at once seen that capital must be got, and for such companies are needed, but when a company promises definitely large and speedy returns from properties with little or no development done upon them, the public should then be extremely suspicious.

The Province has been made to unjustly suffer for the deeds of a few such companies, which have quickly proved their inability to fulfil their glowing promises of quick and large returns, although in some instances, when proper work has been done, these promises may yet be redeemed.

#### Mining Development.

During the past year, much new work was done and much new territory prospected, but no important discoveries of ore were made in the new localities or on new locations, although, in the Nelson Division and along the coast, what may yet prove properties of great importance were being explored. On some of the older claims, new and large shutes of good ore were found, and some claims, hitherto unproductive, at the close of the year promised to join the list of shipping mines during the succeeding one.

Some districts were disappointing, as the comparatively limited work disclosed nothing; but progress in the Province is greatly retarded because so much presumably valuable mineral land can be located and held from year to year without the locators doing a stroke of work other than putting in the stakes. This is contrary to the law governing the location and possession of mineral claims, but the fact nevertheless remains that a very large percentage of claims is held from year to year by men re-locating each other's claims, and then deeding them back to the original holders, so that prospecting work, so very much needed, is not done, and men who would do work are kept out by an array of stakes.

#### Discovery Work.

To correct this serious and growing evil, the simplest plan is to require a certain amount of work to be done within ninety days after date of location. Some at once begin to cry out that this is an outrage on the poor prospector, who should be afforded every facility and protection in his arduous task of exploring these great mountain ranges. So he should; but he should not be permitted, as is now possible, not only to the great detriment of the country at large but to his own, to lock up great areas of country by simply putting up posts and paying a few dollars for recording fees. It will soon be more generally appreciated that if the progress is not being now made that should be, that the reason lies to a great extent in the fact that development is not being done over large tracts of our country that some such regulation as suggested would compel.

#### Prospects.

To the arduous work and privation of the prospector must be due the opening up of any mining region, but, without the aid of capital, his efforts will be discouraging and often fruitless. At the present time, with the interest now taken in British Columbia, capital will send its agents to the most remote and difficult parts, while many other countries are languishing for even a little attention; but these agents naturally demand that some work be done to enable them to form some judgment of the value and possibilities of the "prospect." During the past two years, many seeking mining property for strong companies or syndicates have found that their choice must be greatly confined to "prospects," or undeveloped properties, and as ore deposits very rarely display their charms on the surface, they have had to turn away disappointed in that so little was done on claims they might have been willing to buy at good prices.

In some districts, prices for property have risen to very high figures, even for mere locations, but this phase is gradually correcting itself, and as many owners now wish to join the great rush northward to the new gold-fields, they will be willing to sell their claims at more reasonable rates. This stampede to the north will take many from the southern portion of the Province, but an increasing amount of work will be here done, and investors waiting for a lull in the former high prices will return, so that, while the different mining towns will be quieter, mining will continue to advance.

**Cassiar.** Into the northern portion of the Province, in Cassiar and Cariboo, long known as an almost untracked wilderness, will now spread a great wave of prospectors, with the consequence that trails and routes will be opened up throughout this vast domain, and what discoveries will be made none can foresee. In earlier days were seen gold excitements at several points, but quartz ledges were not looked for and ignored, but now both placer and lode mines will be eagerly hunted for. Quite a number of men have in the past ventured into parts of these fastnesses, to return with favourable reports that were then not listened to, but will now be willingly received. The two railroad companies, with large land concessions, are preparing to offer large inducements and rewards to prospectors who will enter their territory and may find placer ground or mineral-bearing veins.

Hence the activity in the north will be great, and the discoveries may be of great value.

#### GOLD.

Gold is obtained either from the gold-bearing gravels of the placer mines or from veins or lodes, and after these methods:—

- (a.) By smelting ore from the veins or lodes ;
- (b.) By milling and amalgamation, together with cyaniding, of quartz ores ;
- (c.) By placer, hydraulic mining or dredging of gravels.

**Smelting Ores.** Gold ores, not amenable to amalgamation or any of the wet processes, but profitably treatable by smelting to a copper-iron matte or base lead bullion and refining, are now the source of most of the lode gold produced in the Province, as at Rossland. By many who are only familiar with free-milling ores, the importance of these smelting ores is not appreciated, but their importance increases when it is learned that by this process a return of 95 to 98% of the assay value is guaranteed ; that smelting charges are decreasing, and that with smelting plants becoming more easily accessible, the owner of a producing property of this class has not to incur the cost of a plant or mill to treat his ores, but can sell at once to the smelter.

Hence large bodies of sulphide, and otherwise refractory gold ores, carrying from \$15 to \$20 per ton in gold, as are being developed in the Province, are becoming profitable and, in some centres, will become more so when the railroads, building or projected, are completed. In Rossland, as stated elsewhere, the average *yield* value in 1897 for 68,804 tons was \$30 48 per ton with a *net* value or profit of \$12 to \$16 per ton, which net value will, in all probability, soon increase.

In the Boundary Creek region the now low grade, gold-bearing sulphide ores may prove, on proper development, to improve in grade as is already promised in the work being done on some of the properties, and in other parts ore of this character may become available with easier access to the smelters. Again, ore of this class, too low grade to pay to smelt, may yet be found profitable by some wet process of treatment, for which experiments have not been exhausted.

Hence with the extensions of the railroad systems now building, cheaper coal and coke and better smelter rates, these smelting gold ores will become more profitable.

**Free-Milling Ore.** Until recently only placer gold was sought out, and quartz veins received scanty and very desultory attention. Now, this search for free-milling gold ores has become more general, but so far the amount discovered has not been large, partly because there has not been time to determine by mill tests the values in the quartz veins found, most of which so far appear to be low grade, hence requiring most careful testing, and partly because enough work has not been done to disclose pay shutes.

A large amount of quartz has been found in Fairview and Camp McKinney in Yale, in Cariboo, in East Kootenay, in the Nelson division, in Lillooet and along the Coast and Coast Islands but, with a few exceptions, these veins as tested have proved to have low values. The "Cariboo" mine at Camp McKinney has a good ore shute that has paid \$190,000 net ; very rich free-milling ore was taken out of the "Poorman" lead near Nelson, and the "Fern" mine near there is now becoming a producer ; but this class of mining has not yet made much headway, although the greater attention now being paid, the erection of stamp mills, etc., will greatly tend to prove up these leads, described elsewhere in this Report.

Mention has been made of the rush northward to search for quartz leads. Samples of good gold-bearing rock have already been received from there, and much quartz is known to exist.

The annual output of placer gold for many years has not been large, but companies are now opening up hydraulic mining leases in different parts of the Province, and some very large work is being done in Cariboo, as described. During the past year some engaged in dredging on the Fraser have met, for the first time, with encouraging success, and as the conditions are better understood and more experienced men, with means and the plants best experience now recommends, attack this problem, the more hopeful it now becomes that the gold lying in these rivers will be at last secured.

#### SILVER-LEAD.

The silver mines of the Province produced by far the greater part of the out-put of the mines for 1897, and although silver is not now held in such high favour, its friends are getting handsome returns from the high grade ores, as produced in West Kootenay. With the notable exception of the silver-copper ore of the Hall mines, and some of the smaller properties, all of the silver ore carries a very high percentage of lead or occurs in galena, and in two or three cases, galena and blende.

During the past summer the rapid decline in the value of silver, that proved so disastrous to other silver countries, had little effect on our silver mines other than to check investment, as the ores were usually of such high grade as to leave, even at the lowest price, a good margin of profit. The price of lead rose considerably, but this increase was off-set by the increase of the export duty on lead into the United States, our best market, of 1.5 cents per lb. on the gross lead contents in the ore.

So far all this silver-lead ore has had to be exported to the United States for treatment, but at both the Trail and Nelson smelters, lead stacks are being erected, and the smelting of this high grade lead ore will be attempted, provided "dry ore," or that containing less than 5 % of lead, can be got to intermix. So far the amount of this "dry" silver ore has been very small in this Province, and its discovery would greatly serve to simplify the smelting of these silver-lead ores within our own borders.

West Kootenay produced nearly all of this ore during 1897, the "North Star" mine in East Kootenay suspending shipments until the completion of the Crow's Nest Pass Railway. As stated elsewhere, the average net or *yield* values of 33,576 tons of the Slocan ore were 108.5 ozs. silver per ton, and 45.7 % lead, with a total gross value of \$97.70 per ton, or \$50 to \$55 *net*.

#### COPPER.

No large copper mines have yet developed. The production of 5,325,000 lbs. during 1897, came almost entirely from Rossland and the Hall mines at Nelson, the average *yield* value at the former being 1.32 %, at the latter 3.63 %.

Work is in progress on the, at present, low grade copper-bearing deposits in Boundary Creek district, and considerable prospecting was done at Kamloops, on the St. Mary's in East Kootenay, and on the Island of Vancouver and adjacent islands, especially at the "Van Anda" on Texada Island, whence several hundred tons of good grade bornite ore were shipped.

In these districts last named, the ore is usually chalcopryite in eruptive, diabasic rock, associated with pyrrhotite and sometimes magnetite. Small bodies of massive "yellow copper" ore have been uncovered, but for such ore to be profitable, there will need to be large bodies carrying a fair percentage in copper, and enough silver or gold, or both, values, for in mining large quantities, as would be imperative, the copper averages would almost certainly become low, hence requiring certain values in precious metals to make a total value sufficient to leave a margin of profit. In these districts some very promising discoveries have been made, and work is being begun upon them.

#### COAL AND COKE.

The production of the Collieries on Vancouver Island was about the same as that of the previous year, but in 1898, the demand for coal should greatly increase in consequence of the very great increase in the number of steamers engaged in the northern trade. The coke ovens at Comox produced over 17,000 tons of coke, mostly for the Kootenay smelters, and large barges are being built so that the coke can be sent to the mainland in cars, to avoid re-shipment there.



The great fields of coal in East Kootenay will soon be available, as the railroad through the Crow's Nest Pass west to the Columbia River will be completed in another year, when coal and coke will be delivered in East and West Kootenay, and thus effect great improvement in the conditions affecting the smelting industry of the Interior.

#### OTHER MINERALS.

- Iron.** About 2,000 tons of magnetic iron were shipped from the Glen Iron Mines near Kamloops, to American smelters for a flux.
- Platinum.** Some platinum was secured from the hydraulic and placer mines in Cariboo and Yale, and the Minister of Mines has asked for samples of black sand to be sent into the laboratory of the Department, where such will be tested free for platinum and iridium, for both of which are ever a good market and good prices.
- Mercury.** The cinnabar mines in the Kamloops district have temporarily shut down, without proving anything yet of value.

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### DEPARTMENT OF MINES.

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#### WORK OF THE YEAR.

The Provincial Mineralogist began in May the field-work of the season in Yale, at Vernon, after which the gold-bearing quartz leads at Fairview and Camp McKinney were examined. Then the different camps in the Kettle River (or Boundary Creek) and Grand Forks Divisions were visited, and a Bulletin would have been then issued if the railroad projects had not been unfortunately deferred for that year, after which it was thought the report published at a later date, as now, would prove of equal service to this promising region.

In July, about three weeks were spent in Rossland studying the progress of mining there; after which a hurried inspection was made of the Trout Lake Division during a period of very wet weather; this season having been unusually rainy throughout the Province. Crossing over the range east of Kootenay Lake by the Pilot Bay Trail, a portion of the territory drained by some of the tributaries of St. Mary's River in East Kootenay, next demanded attention, and in August, after seeing the "Lanark" mine in Illecillewaet, a more extended period was spent in Cariboo, where nearly all the mining enterprises in progress were seen. About the end of September some of the properties on Cayoosh Creek, Lillooet, were inspected, and then the mineral area of Kamloops, after which, or in October, the Mineralogist returned to headquarters, at Victoria.

Two visits were then made, one to Mt. Sicker on Vancouver Island, the other to Texada Island, and in January a short trip was made through West Kootenay to expedite the collection of the statistics of the mineral out-put of the year.

Hence a large area of country, in much of which work is just beginning, was examined, and necessarily this work partook greatly of the nature of a reconnaissance review, so that a report on the general conditions of affairs could be made to the Minister of Mines.

This report gives as full an account of the mining industry in the Province during the past year as has been possible, and by reason of its publication promptly after the expiration of the year, more careful revision and condensation of the various reports have been sacrificed to promptness of issue.

#### OFFICES AND MUSEUM.

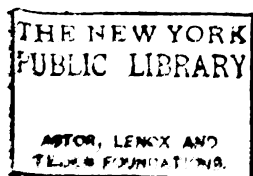
On the completion of the new Legislative Buildings, the offices in the new building were occupied, and the former Legislative Building, now being completely overhauled, will make an excellent museum for the large and good collection of ores, minerals, rocks, etc., now waiting a place for display. Laboratories and class-rooms for the assayer and students will now be equipped, as well as new assay laboratories.



WAVERLY PLACER MINE, BARKERVILLE.



EYE-OPENER PLACER MINE, BARKERVILLE.



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ILLUSTRATIONS.

The illustrations of this report have been made from photographs taken by the writer, with a No. 4 Cartridge Kodak, and the excellent press-work in their re-production is due to the special care and attention of W. H. Clark, Chief Pressman for the Queen's Printer.

## ACKNOWLEDGMENTS.

The writer, the Provincial Mineralogist, desires to express his keen appreciation of the invariable courtesy and willing assistance of all those interested in mining with whom he came in contact, and also of the different Government Officials throughout the Province.

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CARIBOO DISTRICT.

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In the following description of the mining region of Cariboo, it is not the purpose of the writer to attempt the relation of the early history of this now famous section of the Province, but to describe the work now in progress and projected, and some of the conditions that there prevail.

Since the year 1858 to the present time it is estimated that over \$35,000,000 in gold has been taken from the Cariboo gravel deposits of which two and a half miles of Williams Creeks yielded up over \$20,000,000. The production of Williams Creek, Lightning, Lowhee, Antler, Grouse, Keithley, Hardscrabble, Cunningham, Mosquito, Nelson, and other creeks of those early days has become historic, but all these deposits, at present known, have long since been exhausted leaving only such propositions as the deeper diggings that abundant capital well expended, can alone grapple and make successful, or the old diggings and remnants to be worked and re-washed by the skilful and energetic Chinamen who always follow close after the white man to make money out of his prodigal leavings.

Other creeks and untouched gravels may yet be found in this region, although the prospector has been searching for many years, but only twenty miles from Barkerville, it is claimed, lies ground that has been but scantily worked; however, the intense interest now aroused by the great Yukon discoveries will lead many to explore a great extent of territory in this northern country yet untouched, to test many of the creeks by sinking to bed-rock where only the bars have been tried.

Lack of water at suitable elevations has long deterred undertakings that otherwise would be very profitable, as in the creeks above Barkerville is a large amount of good pay dirt that with water could be easily moved and made to yield handsome returns, while the old channel deposits in the Quesnelle District are just now being exploited. Whether this needed water can be supplied or stored is doubtful in many instances, but such will be quite possible in others if the means are available to build water-ways on a bold plan to bring water from long distances as was done in California.

After the cessation of work on Lightning Creek in the seventies, mining in Cariboo fell to a very low ebb until about 1893, when some new organizations with more or less capital began to explore these now practically abandoned placer and hydraulic claims and to prepare for mining on a scale not hitherto attempted, with the result that there has been a decided revival in interest, and besides these companies, other undertakings are under advisement, and if during the coming two years several undertakings that have now reached that point where they should either spell success or failure, prove to be successes, other companies will have little difficulty in raising funds to mine the deep gravels by drifting, or the higher channels by hydraulicing.

## LOCATION.

The Cariboo Division extends for 400 miles north of the Lillooet Division and east from the Cassiar Division to the Provincial Boundary line, but so far nearly all mining has been confined to a district of about two thousand square miles lying between the Fraser River that

first flows north and then south. Access is gained by the excellent Government Road running north from Ashcroft, on the Canadian Pacific Railway, 210 miles to Quesnelle Forks, or 280 miles to Barkerville.

From May to November a bi-weekly stage, carrying passengers, mail and express, runs each way, stopping over at hostelrys along the road where good meals and accommodation can usually be secured, while a weekly stage runs during the other months. During the period of navigation the stage is left for the steamboat running between Soda Creek and Quesnellemouth, making an agreeable change of 50 miles on the long ride to Barkerville. At Quesnellemouth the trails start for Omenica and Cassiar, and other points in the great wilderness to the north, while the stage-road turning sharply in the east runs about 40 miles to Barkerville. During the coming season this highway promises to become of a greater importance as a large number of men with their supplies may enter this northern country *via* this route, bound, not so far as Dawson City, but for the great stretches of untried country that are about to be more carefully explored.

During this last autumn, engineers for the Dominion Government examined the upper reaches of the Fraser and other water-ways north of Quesnellemouth to consider the amount of work necessary to remove several, but not very great, barriers to river steamboat navigation, by the removal of which barriers flat-bottomed steamers from Soda Creek will be able to penetrate much farther north.

#### TRANSPORTATION.

All merchandise, mining machinery, supplies, etc., are carried from the railroad at Ashcroft north, by the freight teams with from four to ten horses each, the former well-known bull-teams having now only one team left on the road. With good roads in good weather a team will go through to Barkerville in three weeks, but with heavy roads it will take much longer. Feed for the horses has to be carried, as such is often scarce and always very expensive, oats selling for 2 to 6 cents a pound, and hay from \$50 to \$125 per ton, according as the season has been favourable or not to the ranchers, who with such prices for their produce promptly paid when mining is in progress, are not very keen for railroad facilities. Since the revival in mining a few years ago, all land that can be cultivated or irrigated has been taken up along the road, and the past comparatively wet season saw bountiful crops, although the year before was a poor one and many cattle died last winter from lack of fodder, and the long, cold season.

Costs of transportation (as well as travelling) are high, so high that the freight charges on mining machinery and supplies are often more than the first cost, but the lowest freight charges can be got during the period of good sleighing in winter when there is a reduction of \$20 to \$35 per ton. In summer the freight charges to Barkerville are 5 to 6 cents per pound, to Quesnelle Forks, 4 to 5 cents, and to intermediate points in proportion.

*Shipping Point.*—Ashcroft is the headquarters of the B. C. Express Company which controls the transportation of passengers, mails and express, to the northern country. For freighting several concerns also make this point their chief base of supplies, and supplies can be forwarded by agents here or contracts can be made with the freighters themselves. During the past few seasons the greatly increased amount of freight has brought a very much larger number of teams on to the road, and besides the regular forwarding companies, there are many independent teams corresponding to the tramp steamers in marine shipping.

#### CHIEF DISTRIBUTING CENTRES.

Along the Cariboo stage road are many stopping places designated according to the nearest mile-post, and from 108-Mile House the road branches off to the mines on Horsefly River. At 150-Mile House is a distributing point of long standing, as from here freight passes on to Barkerville, or that for Quesnelle Forks and the mining companies on the Forks of the Quesnelle, is sent over a new road to Quesnelle Forks, a town that was established in the very earliest days, on the point of land between the North and South Forks. For many years after the wave of whites had passed on to the other diggings, a large colony of Chinamen was settled here, almost the only white man being Mr. William Stephenson, the Government Agent, but since the advent of these large mining companies this place has again become of some importance and now trails lead hence to Barkerville, Quesnellemouth and Horsefly.

Soda Creek, on the Fraser, is the point where the road leads into the Chilcotin country and a steamer can be taken to Quesnellemouth, when there is no ice.

At Quesnellemouth, where the Quesnelle River enters the Fraser, is an important distributing point, where large supplies of goods can be secured and taken by pack animals over the trails, or by small boats, at present, part of the way, into the Omineca and Cassiar and Peace River country, or goods sent into this point by waggon and steamboat are thus sent on. The main road also runs to Barkerville and Stanley.

Barkerville was the centre of very great activity in the sixties, in the heyday of the rich placer diggings, and now is the point from which some of the companies operate, and the quartz-bearing mountains can be reached. It is also the terminus of the Cariboo Road. Stanley, on Lightning Creek, is on the main stage road, but is very quiet since the cessation of mining on this creek.

#### GEOLOGY.

In the report of the Geological Survey of Canada, 1887-8, are contained the results of the geological investigations of Amos Bowman, M. E., from which the following brief sketch is taken :—

**Physical features.** “A closer examination of the features of this region (the Cariboo) establishes the fact that north-westerly trends so remarkable for continuity and regularity in the region of the Upper Columbia, are here carried out in all the geological and physical details. The Cariboo Range, forming the north-eastern limit of the Cariboo country, is the north-westerly continuation of the Selkirk Range. The crystalline schists or ‘gold belt’ seen on Quesnelle Lake, is represented by similar rocks on Shuswap Lake and in Eagle Pass.

“The region of Mount Agnes (near Barkerville) and Snowshoe Plateau is an expanse of smooth and rounded flat-topped schistose hills having the same uniform north-westerly trend, and rising in Cariboo District to an altitude of a little over 6,000 feet. To the right and left of it, following the same trend, are low-lying valleys forming the present drainage channels of the country. These are occupied by recent deposits. Lying along side of them are ranges of hill occasionally rising into mountains, which represent valleys of an older date, i. e., synclinals or troughs occupied by rocks newer than the gold-bearing series. The valley of the Quesnelle River, on the left or south-west side, is 4,000 feet lower than Snowshoe plateau, while the valley of Bear River and Bear Lake, on the right or north-east side, is 3,000 feet lower than the gold range.

“Two remarkable breaks cross the schists or gold belt, connecting the two valleys described. The valleys are occupied by streams characteristic of the present drainage system, and by lakes, Cariboo Lake and Quesnelle Lake extend, or formerly extended, entirely through and across the axis of the gold belt. These lakes, and the low lying valleys connecting them, are accompanied by narrow belts of level land; much of it is in the form of terraces or benches.

“Three-fourths of the territory of the Cariboo District is above the 3,000 feet contour. Snow lies on the ground above that altitude for four months in the year. Quesnelle Lake is closed by ice from November to March.

**Geology.** “Approaching the Cariboo country from Ashcroft on the Canadian Pacific Railway the traveller passes over a region, extending from Cache Creek to Clinton, of chert rocks and limestones which have yielded fossils of carboniferous age, and which occupy the plateau in parallel undulations between the Rocky Mountains and the Coast Ranges. Passing the plateau of the ‘green timber’ (extending over a large extent of country) these undulations are seen to have been completely buried in places by a series of Tertiary clays, sands and gravels, capped by volcanic matter, and covered by drift of glacial origin and date. Underneath the Tertiary represented by the gravels and volcanic matter of the green timber are clays and lignites.

“Exclusive of the superficial deposits, the rocks met with in the Cariboo District may, according to our present knowledge of them, be classed as follows in descending order:—

“**CAINOZOIC.**—Pre-glacial gravels, Pliocene (?), basalts, clay-shales, etc., with lignites, miocene.

“**MESOZOIC.**—Quesnelle River beds, argillites, agglomerates, etc., in part at least lower cretaceous.

“**PALAEOZOIC.**—Bear River beds, limestones cherty quartzites and beds of volcanic material, probably in part Carboniferous.



"PALAEOZOIC (LOWER).—Cariboo schists, rocks more or less completely crystalline, of very varied character.

"ARCHAean.—Quesnelle Lake crystalline series, granites and granitoid rocks."

The geology of those parts of Cariboo visited during the past season by the writer may be briefly outlined from the same source, and the parts of greatest interest are:—

- (a.) Quesnelle River and Lake region.
- (b.) Barkerville region.

(a.) In the Quesnelle region much of this territory, especially to the south and west of the lake, is part of the great interior plateau, while on approaching the rivers the hills become mountainous, which to the east in ten or twelve miles form part of the main range. In this region we are most concerned in the auriferous gravel deposits lying in the ancient river beds, and the terraces of gold-bearing gravels found high up on the hill or mountain sides, which are not only being mined to-day by such companies as the "Cariboo Hydraulic," "Horsefly M. Co.," "Miocene Gravel M. Co.," etc., to be described, but have enriched the present river and streams forming the modern placer ground that has been, and still is, in a desultory manner, mined by whites and Chinamen.

Hence interest attaches to the formations of the Recent, Post-tertiary, Tertiary and Mesozoic periods.

#### RECENT.

"The low lying valleys of Beaver Creek, Quesnelle River and Bear River, and the higher valley of Willow River, are observed to have flats which are frequently a mile to two miles in width. Still higher-lying meadows than those of Willow River are found in places on nearly all the tributary branches at various altitudes. Usually these occur where the configuration of the country has led to the formation of the basins in the interrupted descent of the streams.

"The material of the recent deposits consists of the ordinary thin stratum of humus, or loam, over-lying very extensive bodies of sand and gravel. The latter were washed down from higher deposits of gravel and sediments of older date, and were bedded in the flats by the present streams.

#### POST-TERTIARY AND TERTIARY.

"The formations of the Post-Tertiary and Tertiary are unimportant as to the area covered and are superficial in character, but, in point of fact, the entire surface of the country is covered by Post-Tertiary detritus, blending into still older gravels, partly Tertiary, of as great, or greater, economical importance.

"The volcanic rocks of Tertiary age, which are so widely distributed over the Plateau, were noticed at only two points, viz.: on the north arm of Quesnelle Lake and at Guy's Mountain.

#### MESOZOIC.

##### **Quesnelle River Beds.**

"A large area which can be definitely referred to the Lower Cretaceous, accompanied by an old series of rocks (which may be Jurassic) occupies the trough of the Quesnelle River valley.

"This belt is crossed in travelling from Beaver Lake to Quesnelle Forks, and thence to Kangaroo Creek. It has an average width of sixteen miles, within the area of the map. All along the Quesnelle River, and at Cedar Creek on the lower Quesnelle Lake, this formation has yielded auriferous gravels. These were the first 'pay-gravels' discovered, and the first to be profitably mined in the Cariboo country.

"The prevailing habitus of the series is that of mixed volcanic and sedimentary rocks. Massive beds succeed each other with great regularity. The limits of the formation are:—Along Beaver River valley, on their south-west side, and along a line from Upper Swift River to Spanish Lake valley on the north-east side. The latter boundary extends in a north-westerly direction to Lightning Creek, below the Bonanza Mine, where it forms Red Canyon of Lightning Creek, between the Bonanza and Boyd's Cold Spring basin. In the opposite, or south-westerly direction, it continues to Quesnelle Lake, striking the lake a few miles above Lynx Peninsula, thence eastward, it forms the south shore of Quesnelle Lake.

**Aspect.** "The hills composed of these rocks are much lower than those of the under-lying gold-bearing (Cariboo) schists on the north-east. Their surface is rough and craggy. Generally they are from two to three thousand feet lower than those of the gold-bearing schists.

**Rocks.** "The bulk of the strata constituting the group are chiefly the result of sedimentary deposition, while others are clearly of contemporaneous volcanic origin, both molten and fragmental. Among these were found the characteristic conglomerates of the Shasta group. The cementing material is often a brownish or greenish mass. From conglomerate to breccia, with the same cementing material, they pass into a compact rock consisting of the cementing material alone. Sometimes this is crystalline and in massive beds, less frequently bedded. Of the mineral ingredients, aside from hornblende and feldspar, the crystalline varieties are frequently fine in grain and not readily determined without the microscope." (*See Reports on the Cariboo Hydraulic Co., and the Miocene M. Co.*).

Under this heading may be described, in short, the very important (B.) **Barkerville** area of the "Cariboo Schists," in which the famous gold creeks of this **Region.** district have carved out their basins and which carry the many but, as yet, unproductive quartz veins. Dr. Dawson, Mr. Bowman, and other geologists and mining men believe these gold schists to have been the source of the gold in the great placer deposits, and the day may yet come when paying mines will be discovered among the many quartz veins in these schists, which hitherto have failed to disclose shutes of pay-ore. (*See Report below on quartz veins.*)

Mr. Bowman has stated that these "gold schists of the "Cariboo Schists" occupying a belt sixteen miles, with a probable depth of 5,000 feet, consist of very highly altered sediment clays and sandstones, with occasional bands of limestone and calcareous shales, comprising the well-known and characteristic 'slate rock' that varies from black to bluish shale to a more or less foliated grey or green chloritic or talcose schist, which to a great extent has been metamorphosed to the typical mica-schist, the most characteristic and widely distributed of the varieties of the "Cariboo slates."

These rocks to a great extent are highly crystalline, thus distinguishing them from later formations, conform in strike to the general north-west trend and, being much folded, incline at angles varying from horizontal to vertical. In this excessive folding, from the lateral pressure that has caused this great schistosity, have occurred many fissures or fractures conforming in most part in strike with that of the inclosing rocks in which the large number of quartz veins have been formed, more particularly on the summits than in the lower lying or valley portions. Dykes of various kinds of eruptive rock are occasionally found. (*See quartz veins below.*)

## OPPORTUNITIES FOR THE INVESTMENT OF CAPITAL.

In the Cariboo Mining District are opportunities for the, probably, very remunerative investment of capital, provided that most careful investigation is first and always made of any property proposed to be mined, and of all the requirements and difficulties likely to be met with, prior to the commencement of regular mining operations. In most cases this preliminary work to determine the possible gold yielding values of the deposits, whether gravel deposits suitable to hydraulicing or to drift mining, or quartz ledges, will require considerable capital to thoroughly test such, as up to the present time, all known enterprises anenable to more limited financial means have been worked out, leaving only such undertakings as abundant capital alone can afford to attempt.

As described below, some strong companies are now engaged in large mining ventures that will greatly demonstrate in the near future what and where successful issues may be expected. If some of these prove successful, other and similar opportunities are here awaiting exploitation, and much property now held speculatively and awaiting the results of those being tested, will be available.

It is needless to specify that to embrace any such opportunities there are demanded:—First, abundant capital, and secondly men of undoubted experience, able to make the proper preliminary explorations, and then to work such property after the best possible manner that experience can dictate. Several enterprises here are now in the hands of thoroughly experi-

enced men, past-masters in the kind of mining in which they are engaged, but unfortunately others have met failure, or will do so by reason of the fatal inability of the men in charge to correctly prospect the property, to foresee and forestall difficulties, to estimate the needed amount of capital, or to expend it to the best advantage.

## THE POSSIBILITIES FOR SUCCESSFUL MINING MAY BE NOW OUT-LINED.

### (A.)—HYDRAULIC MINING.

First—In the Quesnelle River District, the extensive auriferous gravel deposits in the ancient river system as yet betrayed only here and there, as at the “Cariboo” or “Horsefly” mines, or at those other points where little work other than enough to prove the existence of these gravels has been done, certainly merit careful investigation. Provided sufficient water can be obtained, as will be discussed below, gravel deposits known to exist almost beyond doubt, both north and south of the Quesnelle River, should be prospected, and the rich ground now being opened up in that portion of the channel known as the “Cariboo” mine should be a very strong incentive, although it does not follow that a deposit of gravel of this same period found a few miles distant, is necessarily part of the same channel, or carries any such values as this mine does. However, much of this gravel explored only in a small way, has proved to carry gold, and should be further tested, for with good dumping facilities now there, some of these deposits may prove to be very valuable if sufficient water can be brought into these claims, and probably the drainage area available within a radius of twenty miles may supply enough water for five or six hydraulic propositions. Some of these gravel deposits are described below.

Quesnelle Forks, *via* 150-Mile House, is the chief point in the Quesnelle region.

Second—In the Barkerville District, it is reported by many familiar with the ground, that along the creeks from which high values were mined out in early days, there remains a large amount of gravel that will pay well if mined by hydraulicing, but so far as these creeks are at a relatively high altitude, and near the sources of the water supply drawn from a very limited drainage area above, the supply of water is here very limited, or only available for four to six weeks when the melted snow fills the streams for a short time. For many years, hydraulicing, in a comparatively small way, has been done at several places while this rush of water lasted, with profitable returns.

It is claimed that a large supply of water might be brought fifty miles, but this would require much capital. In the lower parts of some of these creeks the hydraulic elevator might be used were water plentiful, and to work over a large amount of gravel in Williams Creek, below Barkerville, the Cariboo Gold Fields is now expending a large amount of money in ditches, flumes, sluices, &c., this company having secured the major part of the water supply of this district.

Annually, mining of this kind is done on Grouse Creek, at the “Waverly” Mine; on the “Black Jack,” “Eye-opener” and “Forest Rose,” near Barkerville; on Stout’s Gulch, Lowhee and Mosquito Creeks; while the Chinamen are working some of the benches at several other points and cleaning up a few thousands of dollars every year.

Thirdly—As the district now under report is only a small part of the  
**Barkerville,** Cariboo Division, new territory may yet be discovered, especially along the  
chief point. continuation of this gold belt to the north-west.

### (B.)—DRIFT-MINING.

In these famous creeks the gold was found at bed-rock, sometimes at very little depth, as in the upper part of Williams Creek; but drift-mining was almost general, tunnels being run up stream or into the banks to tap the benches on the rims, or shafts were sunk 50 to 125 feet or more deep. Unless drained by tunnels some 2,000 to 6,000 feet long, all mines opened by shafts had to contend with a large volume of water in most of the creeks; and with excessively high freights and long delays, the miners were thrown back on their own resources and ingenuity, and with very little iron-work at hand, it is surprising how cleverly they handled, with really primitive means of over-shot water-wheels and Cornish pumps, such bodies of water.

With water and much very bad, soft or "running" ground, or "alum," these men contended against almost insuperable difficulties, but won, and among the Cariboo men was thus trained by hard necessity a band of miners patient, resourceful, and extremely skilled in working the most difficult kind of gravel diggings.

In working down these streams, as on Williams, Lightning, Antler and other creeks, the gold was found to be in much smaller grains and more widely scattered; and also as the creeks lost their grade and became wider, the water became far too much for any pumping appliances then to handle, and mining stopped here. Many futile attempts were made to bottom these channels, but water always drove them out, even though large pumps were put in, as at the Kurtz & Lane shaft on lower Williams Creek.

To-day some of these deep channels are being explored, and other enterprises of this character are under way. On Willow River, at the mouth of Mosquito Creek, Mr. Laird has pluckily stuck at his attempt to explore the deep channel of this river, the gutter of which lies nearly 110 feet below the present surface, and this winter, barring mishaps, should know whether gold in paying quantities occurs along the deep bed-rock. On Slough Creek, Mr. Hopp and Mr. Sargent, for their company, have maintained their struggle to bottom that deep channel opposite the mouth of Nelson Creek.

In this kind of work, the gutter or lowest point of the channel is ascertained by sinking a series of holes to bed-rock with some form of boring machine, the Jetting-machine, made by the Aurora Well Works, Illinois, having proved very efficient. Of course it is almost impossible to determine any values that may lie in these deep gravels by means of such small holes, but having located the deepest point in the cross-section, the next step is to sink a shaft in bed-rock so as to get at or immediately below this lowest point or gutter. By doing this work in rock the trouble of sinking in the soft ground is avoided, and not so much water has to be handled until the gravel is entered, and powerful pumps can be installed before the main water source is tapped.

In this manner, along many of the famous creeks of this district, such as the lower parts of Willow, Williams, Slough, Lightning, etc., are miles of channel awaiting exploration—it is true that nearly all such ground is now held under mining leases, but with no attempts being made to prospect them—and should any of the above enterprises prove successful, capital will be encouraged to exploit much more of this ground, from which, higher up the streams, so much gold was mined in the early days.

Of course, in this work, water will be the greatest factor to contend with, but with modern pumps and a lift of only 100 to 300 feet, a large volume of water can now be easily handled. In nearly all these channels is a stratum of boulder clay of greater or less thickness, and practically impervious to water, and if mining can be done without piercing this stratum the flow of water to be handled will be much less than otherwise by keeping out the surface drainage.

In the Quesnelle district, much interest has been aroused by the exploratory work being done by Senator Campbell near the Horsefly River, where he is sinking a shaft, now 250 feet deep, in the gravels lying in an ancient channel here discovered. Bed-rock has not yet been reached, but should this endeavour prove a success the continuation of this channel will be traced; then it should be invariably cross-sectioned with bore-holes to find the gutter, as, in the long run, this preliminary will be found to be the most economical, as the shaft can be sunk at the best point.

In sinking the above shaft, the flow of water has proved to be very small, the thick stratum of boulder clay again keeping out surface water. As described below, at the Ward Mine close by, the gravel bars there have been enriched where the modern Horsefly crosses this channel, leading to the expectation that this deep shaft will prove this channel, now located by holders of mining leases for miles along its supposed course, to be rich enough in gold to permit drift-mining with profit.

#### (C).—PLACER MINING.

Placer mining, other than by means of large hydraulic plants for low-grade gravels, is now mostly confined to the work done by the Chinamen, who are taking out a decreasing amount of gold annually, and unless new diggings are found on other creeks, most of which, within a considerable radius of this district, have been carefully prospected, this class of mining will before long practically cease.

The beds of the various creeks in which gold has been found have been also carefully worked over, except in the very deep and rapid channels, but on the South Fork of the Quesnelle, a rapid flowing river of size in which much gold has been found, the Golden River Quesnelle Mining Co., by damming back this river where it flows from the lake, hopes to be able to thus lay bare this river bottom in long enough periods to permit the mining of those parts of it hitherto out of reach.

#### (D.)—DREDGING.

Some attempts, with very small success, have been made to dredge the bottoms and bars in the Upper Fraser and the Quesnelle, but as most of this work has been undertaken by inexperienced men, and with forms of dredges now known to be useless, very little of practical value has yet been determined as to the values in these gravels. In most of these experiments, the gold-saving appliances, on which success mostly depends, are reported to have been wholly inadequate. Gold dredging is now being carried on in many parts of the world, with some notable successes but many failures, but forms of dredges best adapted are now being better understood, and an important article on this subject is appended to this report.

A company was preparing to work on the Fraser, above Cottonwood River, with a dipper dredge, and another company has declared its intention of putting a number of dredges during the coming year on waters farther north, above Fort George.

There are certainly auriferous bars in many of these rivers, but no reliable data has yet been secured on which to base any further report. In nearly all such enterprises, a rapidly flowing current will have to be contended with, also in many cases deep water and boulders. Suction dredges have been tried but, as at every other place, these proved to be utterly useless, and to those interested in this kind of mining, attention can be drawn to the fact that experience now shows that bucket dredges are proving the only device suitable to the raising of gravel of such deposits to the gold-saving apparatus.

#### (E)—QUARTZ MINING.

During this visit a few of the many quartz ledges in these "gold schists" near Barkerville were examined. Mr. Bowman examined many more and has reported upon them in the Geological Report 1887, and to this report very little more can be added as very little work has since been done and nothing of importance disclosed. The discovery of free gold in the decomposed out-crops of some of these ledges has aroused periodic flashes of interest in these leads, but as no shutes of pay ore have been found this kind of mining has languished and, so far, always ended with no good results.

Although it is a well known fact that many rich placers have never betrayed the source of their gold, on studying the history of the gold-placers formed in the rich creeks that flow down from these mountains near Barkerville, one can hardly help but believe that this wealth of gold had its source close at hand, and that by the erosion of the veins and stringers in these Cariboo Schists, this gold was liberated and concentrated in these streams. For one reason coarse gold, much of which was rough and little water worn, has been found in greater or less quantity in nearly all these creeks where they ran down from these vein-crossed mountains, and invariably on descending these creeks the gold became finer in size and more scattered.

**Veins.** The following are the chief conditions characteristic of nearly all these quartz veins :—

(a.) These veins, to a great extent, conform to the strike but not to the dip of the enclosing schists, but this rule is not general, some veins cutting across the schists ;

(b.) The gangue is almost invariably lustreless, barren, milky-white quartz (the same as found attached to the gold nuggets in the placers) often very hackly or easily crumbled ;

(c.) Much of the quartz, as in the large masses, is perfectly free of sulphides, but as a general rule it carries a small percentage of coarsely crystalline iron pyrites, usually along and near the walls, but also in bunches throughout the mass. A little galena is sometimes present but seldom zinc blende or copper pyrites. The amount of sulphides in some veins is 3 to 6 per cent. of the whole ;

(d.) The values of these sulphides, when concentrated, in gold and silver are often found to be good, but not high ;

(e.) So far no shute of pay free-milling quartz ore has been found, although on several veins the decomposed top material, very limited in amount, has proved rich, but of many mill tests of ore from many of these ledges, the plates have seldom caught more than \$1 to \$4 per ton ;



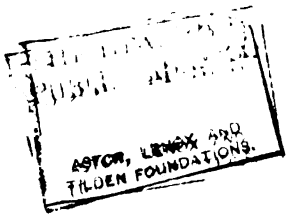
WILLIAMS CREEK ABOVE THE CANYON.



SLUICE BOXES FOR HYDRAULIC ELEVATORS.



SLUICE BOXES AND WASTE FLUME IN WILLIAMS CREEK.  
CARIBOO GOLD FIELDS Co., LTD., BARKERVILLE.



(f.) Some of these veins appear to be traceable by out-crops along the line of strike for one or two miles, but they are very much concealed by surface detritus and under-brush. These veins are irregular, sometimes swelling out to 20 feet or more in width, as in the "B. C." vein, then fading to a stringer, or series of both parallel and ramifying stringers. They are also, near the surface at least, much distorted and often faulted, but often continuous for several hundred feet, maintaining a fair width;

(g.) Often in the same gulch or creek gold of markedly different values was found, gold of a certain grade being confined to a certain section of the channel or bed in the gravel, and not much intermixed with that of another grade; very significant of its probable local source;

Again it is claimed that in some of the creeks where quartz veins were cut across, although to-day little or nothing can be found in such ledges, yet in the placer deposits there was a certain enrichment, often of a gold differing in value from that found in the other parts of the creek-bed.

(h.) Again, it has been found that (a) the schists enclosing these veins carry some gold values; also (b) that a band or zone of the schists may have a series of inter-banded as well as a reticulating system of very small veins or quartz stringers carrying gold and sulphides, very similar to the auriferous schists worked in the Homestake Mine in Dakota. Some work has been done on one of these zones which gave low grade gold values of \$1 to \$7 per ton.

(i.) If pay-shutes are found and worked, in all probability a certain amount of the gold will be free-milling or amalgamable, while that in close combination with the sulphides can be saved to a great extent when these are concentrated, by treating by chlorination or cyaniding, as is now done in so many parts of the world.

As already stated no shute of pay free-milling gold ore has been found in the Cariboo quartz veins, but the underground work has certainly not yet been such as to do justice to these prospects, or to absolutely determine that no pay-shute shall be found, as no shaft has reached a greater depth than 180 feet to show whether in depth values do not increase, or the amount of distortion and dislocation lessen, permitting these veins to be more regular. Considerable capital has been expended on some of these claims, but the work done has not been commensurate with the amount of money spent.

It is true that if pay-shutes exist here, they might be expected to crop out somewhere near the surface, and the discovery of only one such shute would at once encourage a far greater amount of thorough prospecting, but it may so happen that only work in depth will yet disclose this desired consummation, and with only a reasonable amount of capital some of these claims can be prospected to a depth of several hundred feet. During the past season work has been in progress on a number of claims, and M. Emile du Marais, M. E., representing a French Company, after securing bonds on a number of properties, and the use of the Government Testing Works, did some work on several claims near Barkerville, especially on one of the bands of gold-bearing schists, but getting results not sufficiently good to induce him to proceed, he has thrown up most of the bonds and discontinued work for the time being; but even this work, unsatisfactory in its results as far as it went, was far from being enough to demonstrate the latent possibilities in these veins, or to prove them absolutely worthless.

#### QUARTZ VEINS.

Mr. Bowman, in the Geological Report, 1887-8, 31-49 C, has described a large number of these quartz leads as examined by him on Williams, Lowhee, Mosquito, Lightning, Sugar, Grouse, Antler, Cunningham, Snowshoe, Harvey, Duck and other creeks, Island and Round Top Mountains. The writer also visited some of the claims crossed by Williams, Lowhee and Grouse Creeks, Stout Gulch, and on Island, Burns and Amador Mountains.

On the "Black Jack," in the shaft filled with water, a shute of ore, from which some of the best values had been reported, is said to be faulted, below which fault the vein has not yet been picked up. Near the top of the shaft a tunnel has been run in for a considerable distance in which the vein was seen to be split up into a series of stringers, but it is said some gold is found in the whole mass of vein-crossed schists.

On the "Porcupine" and "Steadman" ledges, nothing has been done for years, but on the latter a strong vein, 4 to 5 feet wide, of this very white quartz shows plainly.



"Winthrop" claim shows near the small creek irregular veins and **Stout's Gulch.** stringers of quartz in the schists, and at one place a tunnel had been driven in to tap a large body of this glassy milk-white quartz, which had not continued down in depth.

*The B. C. Mining Company* owns three claims at the head of the gulch on the divide, between it and the Lowhee Gulch, the "Cariboo," "St. Laurent," and "American." This, known as the "B. C. Vein," runs magnetically east and west, with a dip of 72° N., and is, for several hundred feet of large width, one hundred feet of it being 35 feet wide, of barren-looking milky-white quartz. For a considerable length it is 15 to 25 feet wide, but again it becomes a mass of stringers in the schists. On the "Cariboo" claim is the chief work or a cross-cut tunnel 143 feet long, that intersects the vein 53 feet from the surface, where it has a width of 19 feet of the same kind of quartz, with a little iron pyrites. From this tunnel extend 170 feet of drifting, which, with three cross-cuts, show the vein to be continuous for this distance, with an average width of 20 feet. A shaft from the surface to this drift extends 60 feet below it, with a 65-foot drill-hole (diamond drill) in the bottom, all in quartz.

The quartz in this large vein carries from 4 to 5 % of sulphides, which on concentration are said to have assayed in making mill tests over \$20 per ton, but so far all tests for free-milling gold have been very low, or \$1.50 to \$2 per ton, and in this large vein no pay shutes or special pay streaks have yet been developed in the amount of work so far done. All the machinery for 20-stamp mill, pans, settlers, three engines, etc., costing \$61,000, were brought in over ten years ago, to be only stored away and kept in good order to the present time. A good site, with a fair amount of water for milling purposes and good timber, is available about 2,500 feet distant.

Last summer, to the west of this tunnel, a number of open trenches were dug to find the continuation of the vein which becomes much smaller, and holes were sunk with diamond drill, with results not ascertained.

Other but smaller veins were seen in this gulch.

After leaving Stout's Gulch, several claims were seen in this gulch in **Lowhee Gulch.** which old miners claim is a large amount of good ground that could be hydrauliced, as there is excellent grade, but the supply of water is too small to permit other than a small amount of washing in each year, although it is said a fair amount of water can be brought to this gulch by a ditch from Jack of Clubs Creek. The hydraulic leases for most of this gulch are said to be under bond from Mr. Pinkerton to an English company represented by Mr. Rathbone.

The "Gold Finch" claim was being exploited by a Vancouver Company, and a tunnel being driven to strike a vein was in 100 feet, having cut through several small veins 4 to 8 inches wide and one 2 to 3 feet wide of the white quartz and iron pyrites. Other claims in this vicinity were being tested by this same company.

*The Pinkerton Claim.*—The schists are here cut by many small quartz veins and stringers heavily impregnated with coarse iron pyrites, in the decomposed out-crops of which considerable gold has been washed. A little work had been done, but none of these veins could be traced for more than a few feet before it ended or frayed out into stringers.

**Grouse Creek.** About six miles east of Barkerville, where much mining was done in the early days, the cleaned bed-rock is seen to be traversed in many directions by a net-work of veins, but at the head of the creek were seen some large ledges.

*Fountain Head.*—Here a tunnel has been driven a few feet in a large exposure, 4 to 7 feet wide, of broken, rusty, honey-combed quartz carrying iron pyrites and zinc blende, but in another tunnel, lower down, the vein was only 10 inches wide if this tunnel has really gone in far enough to strike this vein that here cuts across the schists and slates.

"Lord Dufferin" and "May Flower" are old locations farther up the creek, on which a large vein of white quartz and a little pyrites crosses the creek. A tunnel on one side runs about 30 feet N. W. along the vein, 4 to 7 feet wide, until it is cut off by a fault, and a tunnel to the S. E. is in over 170 feet, following for part of that distance a wide vein of the same white quartz that cuts across the black slate. The vein appears near the face of this tunnel to be split up into stringers, or to have become very small, but the ground is concealed by the timbering. From a 10-ton test lot of this ore, Mr. Marsh is said to have got \$7 to \$8 per ton. No work being done.

### Island Mountain.

This mountain, lying between Willow River and Slough Creek and four miles from Barkerville, is traversed by a number of veins, upon some of which more or less work has been done, but only those recently worked were visited. However, in the past some very good material has been found on this mountain, the decomposed surfaces of some of the veins carrying considerable gold; but to date, in all the work done, practically little below the surface influences, the veins have been much disturbed and faulted, but they show the same characteristics already outlined, or an irregular persistence along the strike, of the same white quartz with 1 to 5% of sulphides.

"ISLAND MOUNTAIN MINING COMPANY," PRES. C. T. DUPONT, VICTORIA.

This property consists of three Crown-granted claims, two located along one vein, one along a second.

On the "Johns" claim are three tunnels, two of which, three-fourths of a mile by waggon road to the stamp mill, are each from 300 to 400 feet long, showing a vein very contorted and irregular in width of the white quartz and pyrites, for some distances 2 to 4 feet wide, then a series of stringers, but in one place 7 feet wide, but only for a few feet. The third tunnel, higher up the hill, was a cross-cut for 300 feet, wherein it struck the same vein which carries a good width at one place where an upraise has been made.

No work has been done here for some years, but from some of this ore good assays in gold are obtained, although the ore so far disclosed mills very low, or \$2 to \$4 per ton.

The claim west of this is owned by a French company, but no work has been done for seventeen years, when over 3,000 feet were done on a vein, from the surface of which gold was washed from the rotten quartz.

*Little Giant Claim.*—A 40-foot tunnel runs in on a barren-looking vein, 2 to 3 feet wide, of white quartz that carries very little pyrites, and 350 feet lower down the steep hillside another tunnel runs for 60 feet along the vein, which is there faulted, and although the tunnel has been extended 500 to 600 feet (without trying to pick up the vein along the line of faulting), the vein has not been found again.

This company, aided with a bonus from the Provincial Government, erected, nine years ago, above the stage road as it runs along Jack-of-Clubs Lake, a 10-stamp mill, consisting of (a) Blake crusher; (b) 2 5-stamp batteries (made by Prescott Scott Co., 1878, San Francisco); (c) copper plates; (d) 4 4x12-foot end-shake vanners; (e) engine, 15 by 30 inch; (f) boilers; (g) small pump for raising water from the lake. The buildings and machinery are now in comparatively good condition. This mill was run for a short time without vanners on ore from the claims just described, but with very poor results, and yet, after installing the concentrating machines, milling was attempted only for a short time further, when all work was stopped, and the mill has now stood silent for some years.

Burns and Amador Mountains, lying between Lightning and Jack-of-Clubs Creeks, and three miles from Stanley, the chief town on the former creek, are also crossed by a series of quartz veins, on which, in the case of Burns Mountain, considerable work was done ten years ago—veins much similar to those already described. On the north side of Amador Mountain, or overlooking the valley of Lightning Creek, is a series of veins, some 2 to 5 feet wide in places, on which some assessment work has been done during the past year, the quartz of which is as usual milky white, but with very little sulphide, and showing no free gold, which is only rarely seen in the Cariboo veins. Lack of time prevented the examination of many other quartz ledges, on which little or no work had been done, or none at all, for eight or ten years.

### SILVER-LEAD VEINS.

During the past two seasons, there has been some prospecting done on the Clearwater Lakes, the source of the North Thompson River, the prospectors going from Quesnelle Forks via the Quesnelle Lakes, and a number of claims have been staked off on ledges of quartz and galena carrying silver, from which very good samples were seen.

The future of this district depends now upon two factors: (a) the **Water Supply.** quartz ledges; (b) the water supply. Some idea of the former conditions has been given.

In the region about Barkerville, the supply of water is not great, for the reason that the creeks, with their gravel deposits, are already situated high up and near the sources of supply, so that only a comparatively small drainage area is available from which the waters may be stored. The elevation precludes the chance of bringing in water from a distance of at least fifty miles, as is claimed by explorers familiar with the region, hence hydraulic mining will not be possible where it is required to be of magnitude to make low grade gravels profitable.

During the short season of high water, all available water is utilized in washing small benches and other diggings, and, after this, most of the water supply at Barkerville will be diverted to operate the hydraulic elevators on Williams Creek. The summer seasons are usually very dry, so that the supply comes for the most part from the melting snows.

In the Quesnelle region all the possible water privileges, or drainage and storage areas where water can be taken at elevations sufficient to be useful in hydraulic mining, have been now located, except those, if such exist, that are over twenty miles distant from these gravel deposits on the Quesnelle, Cottonwood and Horsefly Rivers. Of these water rights located, probably water enough for eight companies using 1,000 miner's inches may be secured for part of the season, and two, perhaps three, of 2,500 inches and more.

No data as to the average rain and snowfall, extending over a number of years, exist, but as this region also has many dry seasons all the rain and snowfall of the fall, winter and spring months must be stored up in lakes dammed at their outlets or in valleys converted into storage reservoirs. In May and June there is a rush of water in every creek from the melting snows, supplying a good head of water into the month of July, but for the months of August, September and October the storage reservoirs must then be relied upon to make up the then very scanty supply. This falling off in the water supply in the months best suited to this kind of mining has so far proved very detrimental to hydraulicing, and the progress has not been possible that was at one time expected. In California, before hydraulic mining was restricted or practically stopped, water was brought in ditches and flumes for long distances, as 70 and 80 miles, and even 110 miles, and in this district good water supplies may be found lying farther away, which in time may be brought on to these gravels if development work, so very lacking at present, demonstrates that there are large gravel deposits in the Quesnelle District sufficiently auriferous to warrant such undertakings. The gravel in the "Cariboo" mine has already been proven to be exceptionally rich, for the extent and depth it has been tested, but a large supply of water throughout the working season of five months is demanded, but has not yet been secured, as a large amount of barren material has to be removed before the mine can be properly and safely opened up to permit the mining of the magnificent deposit of gravel.

If other enterprises are begun it will not be long before all the water in this district draining from that area above the necessary ditch lines will be stored up, and none whatever will be allowed to go to waste.

## MINING OPERATIONS—(A.) QUESNELLE DISTRICT.

### THE CARIBOO HYDRAULIC MINING CO.

This great mining property, certainly one of the finest in the Province, promises to prove one of the great hydraulic mines of the world from its wealth of rich auriferous gravel, ideal location and excellent conditions for mining, when once fully opened up and equipped for maximum work. As work progresses in the sluicing out of this buried ancient channel, as the large amount of boulder-clay (or perhaps volcanic mud) overlying the deep deposit of gravel and filling up the channel is washed away, the steep rim rock of the former river bank is bared, and the large amount of rich gravel exposed.

The property comprises eight mining leases, or 446 acres, that extend for 9,000 feet, or 1.7 miles, along this ancient river, and is located along the westerly side of the South Fork of the Quesnelle River, three miles from Quesnelle Forks, the stage road from the 150-Mile House passing close by the camp and mine. The capital stock of the company was originally \$300,000 in \$5 shares, but was increased in 1896 to \$500,000.

Engineer in charge and Manager, John B. Hobson, M. E., Quesnelle Forks. Assistant Manager, L. F. Warner, Jr., M. E.

The conditions that here prevail have already been described in various other reports, but a short sketch may prove of interest. Geologically the rock formations at this part of the Quesnelle District are eruptives, that immediately at the mine being, as stated by Dr. Dawson, a much altered and shattered greenstone (diabase?) penetrated by syenitic dykes, and including a considerable body of syenite near the "China Pit." The present river, or South Fork, that runs about seven miles in a north-west direction from Quesnelle Lake to its junction with the North Fork at the town of Quesnelle Forks, has for a great part of its length many steep rocky sides, and as the pits of the "Cariboo" mine advance the old rim rock now exposed is found to be also very steep, or with an inclination of 45° to 50°.

As stated before, in the Quesnelle district, the modern placers or bars and low benches of the present streams have, without doubt, been enriched by the cutting through and erosion of these ancient river channels and benches, and in the early history of the placer mining on this South Fork a rich bar was worked at the mouth of Dancing Bill Gulch, down which flows a small stream which has been the great factor in the discovery of this great gravel deposit in that, in cutting its way down to the river, it is now seen that it has crossed the ancient river course at this point, exposing the gold-bearing gravels mined for eighteen years by Chinamen, whose excavation became known as the "China Pit."

This gulch is found now to possess a further significance. The old channel, it is believed, can now be traced for over one mile and a half in a direction nearly paralleling that of the South Fork, from which it is separated for most of that distance by a sharply pointed rocky ridge known as French Bar Bluff, and mining has now advanced so far that it is now believed by many that the channel turned abruptly across or into the modern one at the point above which Dancing Bill Gulch intersects, so that this gulch not only crossed the channel, but followed it on its turn into the river.

To the south-east the channel runs in a well-defined but at one time heavily timbered depression for about half a mile, where it intersects another depression, occupied by Long and Little Lakes, that run westerly to where Moorehead Creek enters the main Quesnelle River, the course, most probably, of an old channel, the relation of which to the Cariboo channel will only be determined by future explorations, as it may yet prove that the ancient river at one time ran through by this other course, but all must yet remain conjectural. A half mile south-east of Dancing Bill Gulch is another small creek that, running down Black Jack Gulch, again cross-sectioned the channel, but did not cut deep enough through the rim-rock to permit the exposure of the gravel, although, by shafts, the gravel there has been tested and found to be also rich in gold. Here the original "South Fork Company" did some hydraulicing after digging a ditch six miles long from Hazeltine Creek, but in these operations the gravels were hardly reached, only the heavy overlying sands and clay. Hence, when Mr. Hobson visited this part of the Quesnelle River the Chinamen, with a 5-inch pipe and 1½-inch nozzle, had worked out about an acre of ground and laid bare a face 300 feet high in their pit, and the mine had grown beyond their limited supply of water and small mining plant; but it was clearly demonstrated that a comparatively limited gulch digging was not here uncovered, but the rich channel of the much older river system, another clue to which was afforded by the South Fork Company, the members of which understood that they were attacking in Black Jack Gulch the same channel.

The total depth of material in the channel at the present point of working is about 400 feet, and a section shows—(a) at surface 10 to 12 feet of surface gravel carrying a small amount of gold; (b) underlying this a bed of very firm clay and rounded boulders, about 150 feet in thickness, perfectly barren; (c) bands of sand and fine gravel, auriferous, 10 to 20 feet thick; (d) lying on bed-rock a great depth, or 150 to 200 feet of exceptionally rich gold-bearing gravel, coarse in kind, containing a large amount of cobble-stones and a fair amount of boulders, mostly of eruptive rock, both massive and stratified.

On the surface the width is about 1,000 feet, hence the bed of gravel will be about 700 feet in width on top, or with 5,000 to 6,000 cubic yards per running foot, but near the opening at Black Jack Gulch the surface width from rim to rim is over 1,600 feet. Hence, there is a vast amount of pay-gravel in that part of the channel already known and now uncovered for about 1,600 feet for part of its width along the channel in the present workings, and although only the upper portion of this gravel has, so far, been mined in the present bench, the high gold values are constantly maintained.

In the section exposed in Dancing Bill Gulch, and about 75 feet below the lower or discharge end of the sluices, i.e., the floor of the first bench, an exploratory tunnel has been run in along the bed-rock or bottom of the old channel, while in pit No. 2 two shafts have been sunk, and from the data now obtained it is seen that while rich gravel lies near bed-rock, the values are not concentrated there, that the gold is disseminated in very profitable quantities throughout the whole deposit of gravel with evident favoured "runs" in gold throughout the mass, especially near the inner curves of the channel. From the position of the boulders in the deposit, or up-end pointing down stream, Mr. Hobson believes the flow of the river was to the north or out in the direction of the present river, but as the lower bench is advanced the slope of the bed-rock will then demonstrate positively in what direction this ancient river flowed, and afford another clue to the study of this ancient system. The gravel is very firmly bedded, requiring a strong head of water to effectually break it up, but no sign whatever of cementing could be discovered.

**Clay.** The great over-burden of clay has necessarily delayed the opening up of the mine, as this great mass has to be removed by hydraulicing before the gravels can be reached, and as this mass is very dense, and comes down in large blocks and masses that have to be "bull-dozed" or broken up by explosives before it can be swept into the sluices by the monitor, not only is a large quantity of water required, but also much time, labour and dynamite. The banks of the pits stand perpendicularly, and a hard face forms on this clay stratum when exposed to the air, a fact that greatly aids in lessening the danger from caves into the deep confined workings. In breaking down this bank not only has water been used, but during the last autumn about 60,000 cubic yards were thrown down by sinking a shaft along the rim-rock, driving drifts, and exploding in them about 560 kegs of black powder.

Boulders, of which there is not a very large number, if too large to pass through the sluices, are shattered by having after first being loosened up, a stick of dynamite placed on top, or else two boulders are rolled together and the dynamite placed between and buried in dirt. Of course when the second bench is being worked off, these can be placed back on the bed-rock.

**Gold.** The gold in this gravel is essentially a fine "coarse" gold, well worn and flattened, varying in size from small colours to that of flax and melon seeds, but large pieces worth \$.50 to \$4 are found, some also well worn, attached frequently to pieces of the milk-white quartz characteristic of all the vein quartz found in Cariboo. Little or no "flour" gold is found in these gravels. In the sluices a very small amount of platinum is found, and also water-worn fragments of metallic copper, besides worn pieces of iron and copper sulphides.

**The workings.** The opening up of this mine has already required a large amount of capital, more than was estimated when preliminary calculations were made, but the difficulty of transporting, equipment and supplies was great and the freight charges heavy, as after leaving the main Cariboo Road there were 60 miles of execrable road, and much of the freight was so delayed that it could not be brought in on the better winter road but was detained until the spring when it had then to be taken in under heavy expense or else work at the mine had to be postponed for another year. As to drainage area or average amount of snow and rain fall, there are no data whatever, and to explore the country in search of water supplies, an almost impenetrable thicket had to be cut through. To-day, with roads and trails cut and rough places smoothed out, it seems a comparatively easy undertaking, and the past difficulties and annoyances cannot be fully appreciated. But, although in an unbroken country over two hundred miles from the railroad, Mr. Hobson, assisted by Mr. Warner, has clearly shown himself to be a past-master in undertakings of this character, as all the work so far done has been imperative and what the conditions demanded, and all such work has been done in the best manner, with a view to permanence and the correct method of mining; and while much of the work has been costly it has yet been done in the cheapest way, for thorough work in the first place always proves the most economical in the long run. That there is here a great property that will, when fully opened out, pay largely, is unhesitatingly believed by all who have studied the mine, and it will be many years before this deposit within the confines of this property will have been exhausted.

This property is almost an ideal hydraulic mine with excellent dumping facilities at several points of attack, but the only serious drawback is the depth of overlying boulder clay, to get rid of which is requiring much time and water to make a proper opening so that the channel may be attacked with maximum efficiency. With the great depth of deposit it has

been necessary to work it off in two benches, of which so far only the upper one has been advanced carrying in it this thickness of barren over-burden and 60 to 80 feet of rich gravel, and as soon as this upper bench is advanced far enough so that bench No. 2 can be begun with perfect safety, and this should be possible in one or two seasons more, the main mass of the gravel will be worked off down to bed-rock, and the receipts for the season will greatly increase, while the channel may be opened at two other points providing enough water can be secured to supply all the monitors that can there be used.

Pits Nos. 1 and 2 designate the workings of this mine. Pit No. 2, on the northerly side of Dancing Bill Gulch, lies in the bend or elbow of the channel. Pit No. 1, south of the gulch, is being advanced up the channel along one of the rims or steep banks, for about two-thirds of the width of the channel, and when more water can be put on, the mine will be worked to the full width, both benches advancing. To get rid of the water accumulating in the depression above the pits, a drainage tunnel has been driven through the rim rock so as to discharge in the south fork, and much trouble is thus saved in the mine, especially in resuming work in the spring.

The main water supply is brought in a ditch seventeen miles long from **Water supply.** two lakes, Polleys and Boot-Jack, where dams have been erected at their outlets to empound all the water that drains into them during the season, none escaping except of course by evaporation (these lakes covering an area of 2,200 acres). During the early part of the season the water from the various creeks is utilized, the reservoirs only being tapped when this supply ceases. Thus during the season of full supply, from 2,000 to 3,500 inches are available, but towards the end of August this is very much lessened and a constant flow of even 2,000 inches cannot be maintained. To further increase the supply, a dam, probably 35 feet high, will now be built across Moorehead Creek, whence another ditch, eleven miles long, will bring from this reservoir thus formed, a further supply of water in the latter end of the season when it is the most advantageous time for mining, but when so far the other water supply has greatly diminished or almost ceased. A large amount of water is needed to properly work this property on a large scale, especially in view of the large amount of barren material to be removed, but the present water-shed available to this company is not large, although this new work should greatly augment the supply and permit the hydraulicizing of a greater mass of material.

Work is usually resumed at the end of April, or during the early part **Season.** of May, when a considerable amount of ice and frozen material has to be loosened up and worked away, as the frost loosens the banks and brings a large amount of dirt into the pits, which would have to be hydraulicized anyway. A full supply of water is now maintained until August; but during this month, September and October, the amount is so decreased that the monitors cannot be used continually throughout the 24 hours, but only work for a few hours in each shift, and in September and October only from 4 to 8 hours per day, so that the season is much shortened by the lack of water. To supply more water for use in the last months of August, September and October, and even into November, it is estimated that the water stored up in the Moorehead Reservoir can then be used to great advantage, and in direct proportion to the amount of water will be the amount of ground removed and gold recovered. Climatically the season is at least six months long in which mining can be done, but as yet the supply of water is too deficient to permit maximum work for more than three and a half months. Practically all the drainage available from which water may be collected for this mine has been secured, but one other source may yet be obtained.

There are now 21 miles of ditch. The old ditch, six miles long, from **Ditches.** Hazeltine Creek, is part of the series, and is gradually being widened and improved by lessening the curves and protecting the exposed banks from scouring by stone-walls or planking, as the grade of 10 feet to the mile has proved to be a little excessive for the material here traversed, which appears when first cut into to be firm and clayey, but proves to be open and easily washed away. At the lower end of this ditch the water is dropped 60 feet to a small reservoir, where a ditch runs to the mine, but it has since been continued on the same grade to the pit, giving extra head of water, which is used when a full supply of water is on. In the other direction the new ditch runs 11 miles to Polleys Lake, with a grade of 6 feet to the mile, a cross-section showing a depth of 3 feet and a width of 13 and 7 feet on top and bottom. This part of the ditch has been built very substantially, being thrown well into the bank with easy curves, and very little fluming is used,

except on rocky faces and across very open ground. The maximum capacity is about 3,500 inches, and the cost per mile was from \$6,000 to \$7,000, one mile costing \$15,000, but although the first cost of this ditch has been heavy no costs for repair have yet been entailed, and after mining for three seasons the ditch is in perfect condition. Strong but simple water gates are located at suitable points.

**Pipes.** At the mine the high and low level ditches terminate at the sand or pressure boxes in Dancing Bill Gulch. From the upper, 360 feet above floor of present bench, runs a steel pipe, 48 inches in diameter, tapering to 30 inches in 50 feet, the 30-inch pipe continuing down to where the head is 180 feet; thence 24 inches into the pit and 22 inches in the string leading to the monitor where the inlet is 18 inches, throat 17 inches, and butt 10 inches. From the lower box two steel pipes, tapering to 22 inches, run into the pits with a head of about 300 feet, with branches so that in the two pits there are 4 lines or "strings" of pipe, 3 22-inch and 1 18-inch, or about 6,000 feet in all, equipped with 6 No. 8 hydraulic Giants or monitors with nozzles varying from 5 to 10 inches in diameter.

On bench No. 2, the head of water will be increased about 100 feet.

**Gold saving appliances.** At the time of visit work was only being done in Pit No. 1, into which ran the main sluice, 400 feet long, with three laterals aggregating 950 feet, running along the channel. These sluices are 5 feet wide, 2 feet deep, above the paving of spruce and fir riffle blocks 12 inches deep, but in Pit No. 2, the width is 6 feet. Near the dump where the material discharges into the South Fork, the sluices empty into a paved enclosure, but where bench No. 2 is begun, more complete saving apparatus in the shape of iron riffles and undercurrents will be introduced. The sluices have a grade of 10 inches to the 12-foot box. Freight charges have prohibited the general use of iron longitudinal riffles, six sets being worn out in 1,150 hours in the lower part of the main sluice.

Mercury is used, about one flask per day, in Pit No. 1, when working with a full head of water.

**Buildings.** (a.) In the camp are comfortable quarters or houses, stores, bunk houses, eating house, offices, etc. (b.) A new saw-mill for sawing and dressing lumber, for which all good timber near at hand has been exhausted. (c.) Good powder house. (d.) Blacksmith shop. (e.) Refining and retort house. (f.) Stables, etc.

**Gold out-put.** Since the commencement of operations in 1894, about \$335,000 in gold have been received, of which in 1895, \$60,306.93 came from 210,000 cubic yards of ground, in 1896, \$127,455.24 from 1,055,350 yards, and in 1897, \$139,000 from an amount of gravel not yet made public. In the measurements of ground worked, the large amount of barren over-burden is not included, of which there will be none to handle in the second bench.

#### SUMMARY OF SEASON'S WORK, 1897.

##### *Yield.*

Total time occupied in washing .....	111 days, 17 hours.
" quantity of water used .....	223,416 miner's inches.
" " gravel washed .....	840,130 cubic yards.
Gold product for season. ....	8,078.1 ounces.
Value of gold .....	\$138,559.76.
Yield per cubic yard of gravel washed. ....	16.4 cents.
" day of 24 hours of actual operation. ....	\$1,244.63.
Average duty of water per miner's inch .....	3.76 cubic yards.

The above amount of 840,130 cubic yards of "gravel" includes by far the greater proportion of boulder-clay or barren over-burden or "top-gravel." Hence, if the yield were credited to the actual amount of gold-bearing gravel washed, the value per yard would be very much greater, or approximately the value of the material remaining in the lower bench.

##### *Expenditures.*

The total cost of operating for 1897 was \$91,311.77, of which explosives cost \$19,300, and mercury, loss for season, 23 flasks, \$1,116.70.



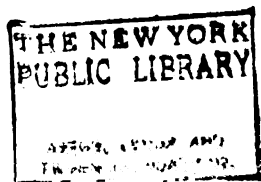


FIRST BENCH, ADVANCING ALONG CHANNEL.



JAPANESE BLASTING THE FALLEN BANK.  
CARIBOO HYDRAULIC MINING CO.





*Receipts for Season.*

Gold product.....	\$138,520.00
Profit on lumber .....	255.94
"    boarding house.....	1,966.12
"    stores.....	3,429.40
"    blacksmith shop.....	370.55
Total receipts.....	\$144,542.01
Total net receipts.....	53,230.24

*Note.*—The above information was kindly submitted by Mr. Hobson, but as the report was then in the hands of the printer, a more detailed and interesting account could not be given.

## GOLDEN RIVER QUESNELLE MINING CO., LTD.

This company, formed in England with a capital of £350,000, £80,000 paid up; General Manager, Major Dupont, Victoria; Engineer, Jos. Hunter, M.P.P.; Mining Engineer, Joseph McGillivray, and Superintendent, J. J. Nickson, has secured the right to mine the South Fork of the Quesnelle River from where it flows out of Quesnelle Lake to where it joins the North Fork, or for seven miles of channel. In the past a large amount of gold has been taken from the bars and bottom of this river, and as it was impossible to lay bare by wing-dams only a small portion of this river-bed, it is believed that a large amount of gold can be won if the river can be checked and dammed up as long as possible, by throwing it back into the lake by means of a strong barrier at the outlet of the lake. Hence this bold undertaking.

Rich bars were found along this stretch of river, which flows in a strong stream of 12,000 cubic feet per second in low water and 24,000 in high water, in a succession of rapids or steep riffles, between steep banks and through canyon-like gorges. As this river has evidently cut across the Cariboo channel at Dancing Bill Gulch, and concentrated a large amount of material from here, and also may be now, below the dam, traversing the same channel or crossing it again, the gold in the present river has been robbed from the ancient water-course and scattered along, some of it being quite coarse.

After studying the various stages of the river flow, the engineers, Messrs. Hunter and Bell, have planned the dam and raceway, now being constructed at a cost of \$250,000, at the foot of the lake where the river, as it leaves, is a little over 400 feet wide. The lakes above cover an area of over 150 square miles. During the summer months, or June to September, the high water season, the flow will be too great, hence mining, it is expected, will have to be done in early spring months and in the autumn before winter sets in, but to what extent and when the water can be thus confined, so as to have the river-bed dry and accessible to mining, will be more positively known on the completion of the dam. However, although this is a bold enterprise it is certainly well worthy of the attempt, and it is hoped that if the water can be held back long enough, rich returns will be the reward, as other undertakings of the same character will then follow. Of course below the Cariboo mine a large amount of tailings will accumulate in the lower three miles, a great part of which will be swept away by the rush of high water.

(a.) Along the right hand bank has been cut out the raceway, leaving  
**The dam.** in the stream a very strong, well cribbed bulkhead or pier 400 feet long and 220 feet wide, 17 feet high above low water. The raceway, 400 feet long and 127 feet wide, has been piled and sheet-piled and very strongly cribbed and planked, and across this will be a series of 9 gates, each 12.4 feet wide in the clear, with a lift of 12 feet in ordinary and 19 feet in extreme flood water, each gate with flanged wheels running on railroad iron and strong lifting gear.

The dam, the race-way and gates being complete, is being thrown across the river on a curve, the segment of a circle with a radius of 415 feet, one end against the bulkhead, the other against the rocky left hand bank. The dam will be 93 feet wide at the base, the crest of the weir being 12 feet above low water, and 5 feet above the average high-water mark, and will consist of a strong cribbing 10 feet wide at the crest, sloping up stream, heavily rocked and with a planked slope for a width of 36 feet where will be a row of sheet piling 6 inches thick, and a slope to the toe of the dam paved with rock. When all complete, and this is expected this winter, the gates will be closed when it is possible to mine these river gravels;

and when it becomes impossible to hold the water any longer the opened gates are estimated to give ample discharge, not only to the regular flow of the river, but the accumulated waters in the lake which can be run off in 40 days.

**Mining.** Mr. McGillivray has been collecting all possible data concerning the former diggings along the river, and has had a waggon road constructed along the right bank with many approaches to suitable points where lumber and other supplies may be assembled, so that as soon as the water is shut off mining operations can begin without a moment's delay. The exact method of mining will be determined by conditions found to prevail, but at first much of the ground will be run through sluice boxes put in at different points, sufficient water being allowed to run for such work. In the deeper portions of the gravels pumps may be required to keep out the water that will, most probably, seep in from the saturated river bottom.

**Camp.** A commodious camp has been built above the site of the dam, where also is a steam saw-mill to cut the logs from fine timber limits along the lower reaches of Quesnelle Lake. It is expected that everything will be completed at the dam this winter when water is lowest, and in the coming spring mining will begin unless the weather is so favourable that work may be attempted before then.

The work at the dam was being done in an excellent manner, and every precaution apparently was being taken to make the work strong, water-proof and permanent, and the project to choke back this river, to bare and mine its bed, will be watched with much interest.

#### CONSOLIDATED VICTORIA HYDRAULIC MINING COMPANY.

This Company, for which Mr. Thos. S. Holt, Montreal, is President, owns a number of mining leases at different points, and a splendid water-right in Spanish Lake, but although a considerable amount has been so far expended in exploring these different leases not much has yet been discovered, except during the past season, when Mr. D. T. Hughes, an engineer of long experience in California, prospecting the company's leases along Rose's Gulch, that lies a short distance north of the Cariboo mine but on the other side of the South Fork, uncovered an old channel with a deposit of gold-bearing gravel.

At the time of visit, a considerable clearing had been made, and a face was being washed off with a 2-inch nozzle, and already both rims of this channel had been found at a point half a mile up the gulch from the main river. The channel appeared to be about 150 feet wide, and was at a considerable elevation above the bed-rock in the Cariboo mine, the gravel prospected well enough to be very profitable, if further development proves up a large body. Rose's Gulch has apparently cut across a bend in this channel, as along the south side test pits again disclose gravel, while the new waggon road to the dam at Quesnelle Lake, is said to have laid bare an excellent cross section along the right bank of the South Fork. A large amount of gold is said to have been taken from this gulch by both whites and Chinese, and higher up on the north bank of the gulch a small bed of gravel has been washed in a small way, coarse gold being found lying next to a peculiar deposit of "cement" or boulder clay. This discovery is of great interest, and during the coming season will be further opened up and explored, as a large amount of water can be brought from Spanish Lake in a ditch 12 to 13 miles in length, while the dumping facilities are excellent. The company at this point has acquired, or 3 miles from Quesnelle Forks, 4 leases and bonded the adjoining or Bain leases, by means of which a fair water supply can be secured for further prospecting.

On the left bank of the South Fork the company owns several leases immediately northwest of the Cariboo Mine, on which in the past considerable, but unsuccessful, work has been done, the Cariboo Channel having been thought to pass here. Work has also been done, but with poor results, on the lease on the north bank of the North Fork, below the mouth of Spanish Creek, to which water was brought from Spanish Lake in about 6 miles of ditching and a considerable length of pipe-line. Prospecting has also been done, but with no results as yet, on leases on Poquette Creek, near where it flows into Quesnelle Lake. During the coming year it is expected that all work will be concentrated at this discovery in Rose's Gulch, where another clue will be afforded to the as yet little understood buried river systems.

#### MONTREAL HYDRAULIC MINING COMPANY.

This company having secured 16 leases or 5 miles of ground east of Beattie Creek, on south bank of the main river of the Quesnelle, 16 miles west from the Cariboo Mine, considerable work has been done, but none during the past year, in exploring a gravel deposit

believed to be in a channel or part of the ancient river system. There is here a large amount of gravel, auriferous, and a tunnel 1,000 feet long has been driven in gravel, but not on bed-rock, with cross-cuts 500 feet long to rock, thought to be the rims of the channel, here 500 feet apart, this supposed channel running through a valley or low depression from 2,000 to 3,000 feet wide. Also several shafts, 10 to 60 feet deep, have been sunk through surface dirt or alluvium to the gravel, which is said to be fine with some boulders, with, as far as prospected, low but pay-values in gold.

For hydraulicizing, water-rights have been secured on Beattie Creek, across which, where it runs out of a low-lying valley occupied by a series of meadows and lakes, and descends through a steep and narrow valley, a dam 55 feet high, 250 feet long on top, and 40 feet at the bottom, could be constructed, and the water carried from this reservoir through 10½ miles of ditch (or 8½ miles by tunnelling 1,500 feet) and 4,000 feet of pipe-line across Beaver Valley to the river, where there would be a fall of 300 feet from the pressure-box to bed-rock. For dumping the sluices can discharge into the Quesnelle River with a clean drop of 100 feet. The present management is endeavoring to form a company with sufficient capital to more thoroughly exploit and test this ground and, if favourable, to put in the water-courses and open it up for mining. President, F. C. Innes, Vancouver; Manager, Thos. Drummond, Quesnelle Forks.

#### BORING OPERATIONS.

Immediately south-east of the Cariboo Mine, boring operations for Mr. Thos. Mill have been in progress during the past autumn in search of the continuation of this channel to the south-east, but, although a wide cross-section had been made, no channel was discovered as far as reported to date. Under direction of Mr. Hermann, Vancouver, the holes were being drilled to bed-rock with a very complete portable boring rig made by the American Well Works Company, Aurora, Ill.

#### MOOREHEAD CREEK GRAVELS.

As an example of the gravel deposits lying yet untouched, mention may be made of the above. Near the mouth of the Moorehead Creek, six miles below Quesnelle Forks, is the almost irrefutable evidence of the existence of a very large deposit of gravel, auriferous, in an old river channel.

At about three-fourths of a mile back from the Quesnelle River the gently sloping ground rises into the steeper line of hills, but here in the depression, down through which Moorehead Creek has cut a narrow gulch, is found a deposit of gold-bearing stratified gravel, gravelly clay and "slum" or sandy clay alluvium, at least 2,000 feet wide and 400 to 500 feet high above the present available sluice-grade, and probably 100 to 150 feet below. Moorehead Creek has cut part of its way through bed-rock, but the lower part has cut down through this gravel deposit not far from the western rim, and then into the rim itself to a depth of 0 to 200 or more feet, leaving benches of gravel remaining on this western rim-rock, while in the creek itself, where it has cut through this deposit, valuable gold diggings were found and worked, and in places re-worked, by the Chinese, which gold evidently had accumulated from the ancient gravel deposit on its erosion by the modern creek.

This channel now presents a quickly sloping face of gravel, silt and sand to the Quesnelle River, and has evidently extended up through the valley in which lie Little and Long Lakes, and entered or crossed the Cariboo Channel in Black Jack Gulch, where it turned and, probably running along the westerly bank, crossed what is now the valley of the South Fork. Beside this channel, there are strong evidences that other channels exist, probably tributary to the main one, bearing gravels that also prospect favourably, such as the channel evidently running towards and through the country now occupied by Moorehead Lake.

Nearly all the ground along the supposed courses of these old rivers has been located, and on the "Marpole" and "Eureka" claims, where Moorehead Creek cuts into this deposit, are two tunnels, one 120 feet, the other 160 feet long, driven in gravel from the rim-rock, which dips down and away from the creek. In both the gravel is rather coarse with, so far, few large boulders, and by panning tests, this material runs from five to fifty cents per cubic yard in gold, seldom a pan failing to yield at least one colour.

Water can be got from Moorehead Lake by storing it in Little Lake, which can be made a good reservoir by putting in a short dam, from which a ditch four or five miles long will deliver water under a 500-foot head. For a dump into the Quesnelle, the sluice boxes will

necessarily have a low grade, or not more than three inches per twelve feet, and the lower part of the deposit below the creek level will have to be worked out by hydraulic elevators or drift mining, if the gravel should prove rich enough.

#### MOOREHEAD WATER-SHED.

During the past season Mr. Warner has been making a survey of the Moorehead watershed, more especially of the contour line to which the lake of this name will rise if a 35-foot dam is put in at the outlet. It has been determined that about 500,000,000 cubic feet of water can be here stored, and it is estimated that a large body can be impounded during the wet season, as at times 20,000 miner's inches per day may flow, or 30,000 cubic feet per minute, while for weeks the daily discharge is from 10,000 to 12,000 inches. A ditch will be built during the coming year to the Cariboo mine, eleven miles, and if there is sufficient water the ditch may be made large enough to carry water to Little Lake, on its way, where a reservoir may be formed if the above properties are opened up.

#### MAUDE HYDRAULIC MINING Co.

On Four-Mile Creek, one and a half miles up from its junction with the main Quesnelle River, four miles below the Forks, has been exposed in the ravine cut by it, a gravel deposit of great width belonging to an ancient channel believed to run, for some distance anyway, along the north of the Quesnelle. These leases are reported bonded to the Yukon, Cariboo, British Columbia Gold Mining Co. of New York, but were not examined, as the scanty exploratory workings were said to be buried by the slide material on the side of the gulch, which also concealed the gravel here cut through.

#### FISHBACK HYDRAULIC MINING Co.

Along the north bank of the North Fork, four miles east of the forks, is a series of leases at one time known by the above title, covering a large and thick deposit of gravel exposed here along the river. Some small test holes have been made and gold discovered, but practically very little has yet been done to thoroughly explore and prove up this property. For water for hydraulicing, water-rights have been secured on Duck Creek, from which a ditch ten miles long, tapping several smaller streams along its course, may furnish an ample amount.

#### OTHER LEASES.

Many other leases have been taken up, but so far little or no development work has been done to prove the amount or probable value of the gravel, work that is so desirable and important before any mining operations can be thought of, or even the proper flotation of companies, for upon the successful issue of work now in progress on other properties already described, many such leases are waiting.

#### HORSEFLY HYDRAULIC MINING COMPANY.

A very interesting mining problem and entirely different conditions have been developed in the gravel deposit in which this company has been working for three or four years, different in that the bed of this channel has so far been found to be dipping at a very flat angle, and that the entire gravel bank has become a hard cemented mass.

This company, with a capital of \$250,000 in \$10 shares, General Manager Jno. B. Hobson, now controls 19 mining leases, or 2,100 acres on the west of Horsefly River, five miles south of the Quesnelle Lake.

This gravel deposit lies on a rock series of the Miocene Period (Dr. Dawson), consisting of a well bedded or stratified formation of partly indurated shaley clays, sandy clays, very soft sandstone and shales, of which none of the members have been hardened into firm, compact rock as the overburden has evidently never been great. Fossil remains, such as fishes, shells, leaves of plants, etc., have been found in some of the strata. In the pit, now seven to eight acres in extent, this formation is seen to have been, before the deposition of the gravel, very much crumpled, twisted and faulted by some lateral pressure, the source of which may be found to have been caused by

the effusion of volcanic matter, of which a chain of knolls one mile to the north and north-east is said to exist. Faulting is in evidence, and later disruption has extended even into the gravel bank, where a down-throw of some distance is plainly seen in the pit, while crevices filled with fine quartz sand extend for long distances through the bank.

The chief component of the bed-rock is clay, which underlying the gravel, is very soft and easily worked out with the pick. This rock shows in few places along the river bank and occurs also at Harper's Bar.

Rich gravel bars were found in the Horsefly River immediately opposite where the present workings are and up on the river bank, about 100 feet above the river bed. This gravel deposit was discovered and

mined in a desultory, small, but profitable manner for several years by McCallum, who had a small ditch running down from Rat Lake. On the purchase of this property, Mr. Hobson had a tunnel started near these old works and run in 500 feet in gravel along the channel ground that always prospected well, and showed no signs of cementing but made excellent hydraulicing gravel.

On completion of the water system development began, and as the bank was worked back it proved to be gravel nearly to grass-roots, while the bed-rock sloped gently southerly, away from the river bank for 400 feet, where the inclination increased to about 12 degrees, which slope has since been maintained in the underground works. Hence, along the river-bank only a narrow edge of this ground had been exposed above this rim, and as the deposit gradually sloped down the face of the work receded from the rim, and to the surface gradually arose a vertical face of gravel 60 to 105 feet high, now standing in the pit (as see in the illustration).

The gravel consists of sand, pebbles, cobbles, and a comparatively small amount of boulders, and among the rock fragments can be found all classes of rock, volcanic, igneous and sedimentary, with many very rounded fragments of barren, milky-white quartz. All of this gravel deposit is auriferous from grass-roots to bed-rock, but the gold is very fine in the upper portions, while the best values are found near the bed-rock, but not particularly at bed-rock, the gold being disseminated through the mass, especially in the lowest stratum, or "blue gravel," upon the values in which the future of this mine now depends. More or less gold had made its way into the shaley bed-rock.

At first this deposit worked out well with the monitors, the gravel breaking up easily, but as the face advanced the gravel began to get harder, and a band of cement from 2 to 10 feet came in, the cementing material being lime and in places strontianite.

As the amount of cement increased and the monitors made but little or no impression upon this material, powder-blasts were put in and very heavy charges of black powder let off, breaking down many thousand cubic yards of bank, which, lower down, proved so tenacious that even then hydraulicing would not avail, as the water would not disintegrate the masses already shattered by "bull-dozing," but swept it with most of the contained gold values out to the dump. After a long, persistent struggle during the season of 1896, it was seen that this method of mining had to be abandoned, and exploratory work was begun to learn whether any of this cement would pay to mine and crush in stamp-mills.

The "blue gravel" is 2 to 8 feet thick, according to the lie of the bed-rock, and is overlaid by a band of nearly barren and very hard cement 6 to 10 feet thick, and to work this "blue gravel," drift-mining has been experimentally begun with the erection of the 10-stamp mill. Three exploratory drifts were 120, 197 and 100 feet in length, in all of which was hard gold-bearing cement that could with difficulty be worked down with the pick, and into which holes for blasting were drilled with the long pointed steel bar. From these drifts and along the face of this bed-rock cemented gravel, as exposed for 700 to 800 feet in the pit, were taken six large samples for practical mill tests at San Francisco, of which the following results were obtained by submitting each sample to the regular stamp-mill process:—

Sample No. 1 from face of gravel in pit west of drift B, 2,854 lbs, yielded \$3.79 per 2,000 lbs.

Sample No. 2 from drift B, 423 lbs, \$5.71.

" No. 3 from face of gravel east of drift B, 2,222 lbs, yielded \$5.46, per 2,000 lbs.

" No. 4 from first 60 feet of drift A, 967 lbs yielded \$4.47 per 2,000 lbs.

These tests gave an average value per ton of \$4.85 in gold.

Three other samples taken by Mr. Anderson along the exposed face of the blue gravel, on testing, gave as follows:—

Sample No. 1—865 lbs yielded \$4.32 per 2,000 lbs.

" No. 2—851 lbs " \$5.94 "

" No. 3—835 lbs " \$6.42 "

Average yield \$5.56 per ton of 2,000 lbs.

Constant panning tests also demonstrated good values in this blue gravel cement, so that the proposition to put in a 10-stamp mill to crush this material was assented to by the directors, and regular underground workings begun, as will be described.

#### MINING OPERATIONS.

##### Hydraulic Mining.

(a) As the bed-rock dips away from the river, to provide the grade for sluices to the dump into the river, which high water scours out yearly, a cut was made through the rim-rock 500 feet into the bed-rock to a point where several bed-rock sluices were then cut to the faces of the bank, cuts that decreased in depth as the grade rose and as at the same time the rock sloped away in the opposite direction. Thus, about 8 acres, or an oblong pit 500 feet by 1,000, of gravel from 20 to 100 feet were worked out.

The water system brings water from Mussel Creek, a southern tributary of Horsefly River, by a ditch and pipe line 12.5 miles in length, with a capacity of 1,800 miner's inches, or 2,700 cubic feet per minute. Of this line there are two sections of pipe 30 inches in diameter, aggregating 8,300 feet, made as inverted syphons, to cross two wide depressions; also 600 feet of flume 3 by 5 feet. Water is delivered at the pit from the ditch line under a head of 168 feet, while from the Rat Lake reservoir under a head of 106 feet, giving adequate supply not only for mining, but for operating a stamp mill.

In the pit is a portable hydraulic plant of 22 and 18-inch steel pipe, and six No. 8 hydraulic giants, or monitors.

##### Sluices.

From the pit to the dump ran a 3 x 5 feet sluice, 625 feet long, lined with wooden blocks in part, and horizontal iron riffles, with 30 feet of a dump into the river.

##### Drift Mining.

(b) A main tunnel has been started at the head of these sluices, or 215 feet from the face of the gravel bank, and run on a grade of nearly .5%, through bed-rock to 400 feet where gravel first appeared in the roof, and at the face (515 feet, Sept. 1st), the bed-rock, which is somewhat undulating, was one foot above the floor, and still dropping. This tunnel is being run at right angles to the apparent course of the stream, and hence will explore this bed-rock if it does not dip too much away or fall below the tunnel level. In this tunnel, upraises had been made to the gravel, and drifts started along it both ways, and this stratum, 2 to 8 feet deep, was being blocked out and mined, as well as a few inches of bed-rock, all boulders or large stones being picked up and piled back to form pillars in the stopes. The gravel prospected well as work advanced, but the gold seemed to be in "runs" through the mass, as was to be expected, and in the first mill run the returns of about 1,200 tons of gravel, dirt, etc., of about \$1.00 per ton could not be taken as an index of the value of the gravel, while a later clean-up is reported to have yielded much better results.

##### Stamp-Mill.

This tentative plant comprises (a) two self-feeders; (b) two batteries of five stamps, each 850 lbs., drop 7 inches, 90 to 100 per minute, depth of discharge 4 inches;  $\frac{3}{16}$  (changing to  $\frac{1}{4}$ ) inch punched steel screens; dies forged steel 7 inches high; mercury, one to one and a half ounces per mortar per hour; capacity, 11 to 12 tons per 10 stamps per 24 hours.

##### Power.

(c) A 16-inch steel pipe brings water with a head of 106 feet to a 6-foot Pelton, but for winter a 35-horse power engine, 10 x 12 inches, will be used.

(d) Gold-saving appliances consist of (1) a riffle-box 4 x 8 feet in front of each mortar, with iron-shod wooden riffles 1 inch wide, 3 inches deep, parallel to lip of mortar, the whole enclosed in locked casings; (2) sluices or riffle-boxes 110 feet long to dump, 2 feet wide, 7 inches deep to riffles, which consist of longitudinal wooden strips 3 inches deep, shod with iron 1 inch wide, and one-half inch apart, the lower 16 feet of the sluices being lined with, instead

of riffles, 2-inch planks, in which are bored 1-inch holes,  $\frac{1}{2}$  inch deep and 1 inch apart in alternate rows. At the end of this line of sluices was a small trap, but no gold had reached this far, and only pyrites were being caught.

In the operation of this mill, two Japs per shift on the feed floor broke up the cement, picked out stones, and fed remainder to the feed-hopper, and for 24 hours in crushing 110 tons of material, the following labour was required :—

Foreman,	1 @ \$5.00 .....	\$ 5.00
Batterymen,	2 " 2.50 .....	5.00
Japs,	6 " 1.75 .....	10.50
		<hr/> \$20.50

Other buildings comprise saw-mill, offices, store-houses, bunk and eating houses, stables, etc.

Timber has to be hauled 5 miles from a good source of supply.

#### *Labour.*

8 miners .....	\$ 3.50 per 10 hours.
2 carpenters .....	3.50 "
1 blacksmith .....	3.50 "
2 millmen .....	2.50 "
2 ditchmen .....	70.00 per month.
18 Japs .....	1.75 " 10 hours.

This force was augmented after September 1st, by about 20 Japs from the "Cariboo" mine.

#### *Values in Gravel.*

During the seasons of 1894-5-6, before hydraulic mining was abandoned, \$92,426 were recovered from 750,000 cubic yards of gravel and extremely hard cement, or 12.3 cents per cubic yard.

#### *Returns for 1897.*

The following interesting table has been submitted just as the Report was going to press. It has been found that with the 10-stamp mill, 135 tons of cemented gravel can be crushed per 24 hours, and that the total cost of mining and milling will not exceed \$1.40 per ton.

In the following table it will be seen that the grade of the gravel shows a steady improvement in value. Work during the winter has been suspended, to be resumed in the early spring :—

#### *Stamp-Mill Report.*

DATES.	Mill run hours.	No. Stamps.	Tons of grav- el crushed.	Gold Recovered.	Yield per ton.
July 10th to August 3rd .....	426	10	1,100	\$1,093.07	\$0.99
August 3rd to September 5th .....	488	10	1,660	1,890.78	1.13
September 5th to October 3rd .....	538	10	1,987	2,488.12	1.25
October 3rd to October 10th .....	133	10	629	1,120.00	1.78

#### WARD'S LEASE OR HORSEFLY GOLD MINING CO.

This company, capital stock \$1,000,000 in \$10 shares; Manager, R. T. Ward, Horsefly P. O., owns the lease of ground one mile by one-half mile along the Horsefly River at Harper's Bar, 5 miles south of the workings of the Horsefly Hydraulic Mining Co.

The Horsefly River flows through a rather swampy, flat-lying valley for several miles, but gold was discovered on Harper's Bar, from which considerable gold was taken by both whites and Chinamen. At this point the bed-rock is the same as at the Horsefly mine, and in the present river the gold has been found in a yellow gravel, but on mining, damming, and



sinking shafts, a rich blue quartz gravel was found lying on a steeply-pitching rim-rock, and on sinking more shafts, such as the Riskie, 136 feet, Veith and Borland, 70 feet, good values were nearly always found along and near this rim-rock that dipped at an angle of 30° to 35°. Further work, as in the "China Pit" and other shafts and drives, the pitch of the rim-rock and the large deposit of hard blue gravel, made very patent the fact that here the Horsefly River has cut across a deep, wide, ancient channel and enriched the latter bars by gold washed out of the blue gravels and especially that near the rim-rock.

Knowing these facts, Senator Campbell, on the adjoining property described below, has sunk a 250-foot shaft, further proving the existence of this channel.

To work this gravel at Harper's Bar, an hydraulic elevator plant has been installed, as nearly all the ground that could be laid bare by wing-damming, etc., had been worked, and two pits have been begun, one on either side of Horsefly River, but lack of water prevented the final clean-up of the sluice boxes, the pits at once filling up when the elevators ceased working. This mining is not only removing the modern gravel, but is laying bare the rim rock of shaly clay rock and blue gravel, of which a considerable amount can be thus handled if sufficient water is procurable and the sluices are run out to give a good dump to the tailings.

**Water.** By agreement with the Horsefly Hydraulic Co., this company secures all surplusage of water in Mussel Creek above what the former company requires and can carry off in its system of ditching, but this arrangement has already led to trouble and legal complications.

(a.) A ditch 5 miles long, 4 feet wide on bottom, 3 feet deep, and grade 6.4 feet per mile, has been dug from the dam on Mussel Creek, then

(b.) A pipe line 9,500 feet long has been laid to the mine, of which 7,000 feet are 30 inches in diameter, of No. 12 steel plate, reducing to 26 inches in diameter, while below the Y, two lines, each 22 inches in diameter, are contracted to 15 inch pipe for the elevators and 11-inch for the monitors, so that there are about 13,000 feet of pipe line. The total head of water at the elevators is 305 feet, with a pressure of 105 lbs. per square inch.

**Hydraulic Elevators.** (a.) In "China Pit," on left hand of the river, the elevator lifts the gravel, water, etc., 40 feet into the sluices, and with a 4-inch nozzle 12-inch throat and 18-inch discharge pipe, elevates about 1,000 cubic yards of gravel per 24 hours, using a No. 3 monitor with a 3-inch nozzle.

(b.) In the other pit the elevator, with a 5-inch nozzle, a 16-inch throat, and 22-inch discharge pipe, is calculated to raise 33 feet, 1,500 cubic yards of gravel, using a No. 3 monitor with 4-inch nozzle.

**Sluices.** (b.) In the pits at the foot of the elevators are short sluice boxes 20 to 24 inches wide, and at the head the discharge sluices are 34 and 48 inches wide, but comparatively short length, so that the tailings are being dumped close to the pit.

During the last season mining operations began April 13th, and a full supply of the water lasted to August 20th, but mining could not be carried on all that time, for in the season of highest water, for 4 to 6 weeks in June and July, when water is most abundant for mining purposes, the workings are flooded, except the "China Pit," which is flooded only in excessively high water. This pipe-line will not carry enough water to keep both elevators working at the same time, the large one requiring the maximum supply for efficient work, the smaller one in "China Pit" being used when water begins to slacken. Hence when water is in greatest supply, flood water greatly prevents its use. On the stoppage of the water some of the sluice boxes were cleaned up, but a general clean up was not possible before the pits filled, for although some gold is lifted with the gravel the most of it is caught in the boxes at the foot.

Trouble and delay were felt by the wearing out of castings in the elevators. During another season if a continuous supply of water can be got, a much greater amount of gravel can be mined, the pits got into better shape, and some definite results obtained, and as the rich ground gets below the influence of these appliances, drift mining will have to be resorted to if the ground proves to be rich enough to pay for this system of mining.

Timber is scarce close by and has to be hauled two or three miles. While working, 16 men were employed at \$1.50 to \$2.50 per day and board, pipe-men getting \$2.00 per day and board, and the necessary rubber boots.

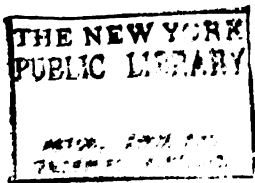
An electric lighting plant lights the workings with seven arc lights, a pipe running from the main line to a Pelton wheel, that supplies power for the dynamo.



VIEW OF RACE-WAY AND DOWN THE RIVER.



SITE OF DAM WHERE RIVER LEAVES THE LAKE.  
GOLDEN RIVER QUESNELLE, LIMITED, CARIBOO, B. C.



### MIocene GRAVEL MINING COMPANY, LIMITED,

This company—capitalized at \$300,000, in \$10 shares; President, G. Drysdale; Secretary, F. J. Coltart, Vancouver; Manager, R. H. Campbell, Horsefly P. O.—has secured twelve leases, or 960 acres, and applied for two more, or 160 acres, along this channel crossed by the Horsefly River at Harper's Bar or Ward's Mine, and thought to extend to the north-west, down through Beaver Lake Valley, where are found outcrops of gravel quite similar to that found here.

Senator Campbell, on studying the conditions at Harper's Bar, and recognizing the fact that the shafts sunk here and all the other workings betrayed the existence of a large ancient and gold-bearing channel running east and west through this flat-lying country, having secured the ground lying on the west of the Harper lease, began the sinking of a shaft 4 by 8 feet, to exploit this channel. As the values are thought to be along the rim-rock and bottom of the channel, it was hoped that this shaft would reach the bottom of the channel, but at a depth of 250 feet the shaft was still in the blue, hard gravel, showing an unexpectedly great depth. For the first 65, feet the shaft passed through hard boulder clay that near by forms one of the banks of the Horsefly, and then into the great deposit of gravel, in which is a large amount of quartz pebbles and small boulders or cobbles, perfectly water-worn, and a small amount of very fine gold.

**Shaft.** At 250 feet, a run of fine sand checked sinking, as the pumps and hoisting plant were hardly adequate, so great a depth not having been anticipated; so sinking was stopped until heavier pumps could be installed, although the flow of water is small, or about 35 gallons per minute. Instead, after putting in a pump station at 180 feet, a cross-cut was started and run to what may be the rim-rock. If, on reaching bed-rock, gravel is found rich enough to pay for drift-mining, having ascertained the exact position of the gutter or lowest point of the channel, a working shaft can be sunk with proper hoists and pumps for the water, that promises to be light in flow, as the boulder-clay keeps out all surface water, and it is possible, in the Beaver Lake Valley, to run a long tunnel to drain and exploit a long stretch of this old river course, after thoroughly prospecting with drilling machines, which might have been used to great advantage before the present work was undertaken. There are no signs of cement-gravel so far to be seen.

The results of this prospecting will be of very great importance, for, if favourable, the course of this channel, or system of channels, will be extensively explored, and other mining companies will have no trouble in raising capital to work on a large scale, and work on this property as well as on the Ward lease will be closely watched. At time of visit 15 men were employed, and at the shaft, which was well timbered by cribbing up solid with sawn timber and with square sets and spiling below the pump station, there were a 25-h. p. hoist (Park & Lacey), good boiler, sinking pump and small saw-mill, but this prospecting was being done as economically as possible. Much heavier hoisting and pumping machinery is now en route to the mine.

### OTHER LEASES.

Many leases have been taken out along the supposed channel courses, the holders of many of which are awaiting for developments; but to the east of Ward's claim Mr. Leask has secured several leases, on which shafts have been sunk in the same kind of gravel, one 60 feet deep, but not to bed-rock on account of water and no pumping facilities, showing the continuation in this direction of this channel through a low-lying depression.

### GOLDEN PROVINCE MINES Co., LTD.

#### *Drift Mine.*

A company with a capital stock of £125,000 has been formed in England by Mr. C. F. Law, of Vancouver, to prospect a very interesting property on Baker Creek, three miles west of the Fraser River at Quesnellemouth where, on the face of a bluff, a deposit of wash gravel is clearly seen to be overlaid by a basaltic overflow.

A block of land  $2\frac{1}{2}$  miles square has been secured, and the following work is being done by Mr. Law:—

The top of this lava-capped bluff is 1,000 feet above the Fraser or 825 feet above Baker Creek, and a sheet 50 to 60 feet thick of lava very spheroidal in structure in the lower part,

lies upon a narrow band of sand, below which is a great thickness of fine gravel and sand with many quartz pebbles and cobbles. This face or section is normal to the direction of Baker Creek and parallel with the Fraser and, it is now believed, across the old river channel thought to be here.

Just below the steep part of this bluff, a shaft was sunk 260 feet through this gravel to the slaty rim-rock, and there a drift was run north 220 feet through a more or less cemented gravel that required shooting to the other rim-rock which, on both sides of this apparent channel, is steep and smooth. In the centre of this cross-cut a blind shaft was sunk 60 feet until water became too strong, but in the bottom there was taken out a reddish gravel and slaty detritus, fallen in from the old river banks, or fragments of slate, shales and blue quartzites, at least this was the kind of material pointed out to the writer, who was unable to get into these workings. From this material in the shaft, Mr. Law states, was washed fine gold and, with the data obtained in this working, he determined to begin at Baker Creek a tunnel to be run straight for this shaft, to determine whether the bottom or gutter of this channel is *above* or *below* this tunnel level.

It is estimated that it is above, so that the gravel, if such proves sufficiently rich in gold, can easily be worked down into sluices in this tunnel, but the gutter may be below, and this will only be determined when this tunnel is in far enough to strike, or else pass under this channel. If it passes under the channel, the prospecting and mining of such a gravel deposit will be comparatively simple, but if the gutter is below this tunnel-level, it will then become a difficult matter to handle this material.

However, this is a very important undertaking, and its progress is being watched with great interest by many.

The tunnel was in 425 feet (September 20th), with 1,100 feet still to run to be under the blind shaft where it will be 170 (?) feet below the shaft. The tunnel is 6 by 7 feet with a grade of 2 per cent. for fall for the sluice boxes that, it is expected, will be installed. In this tunnel, the slates are traversed by many small veins of white quartz, and at 100 feet, a band of quartzite material carrying a little sulphides was passed through.

A five-drill air compressor, a 30 h. p. boiler and two drills had been ordered from Joshua Hendy, San Francisco, and is now in place at the mine, and with this plant the work will be greatly expedited. Good spruce and fir timber can be got three miles distant.

Mr. M. S. Clark was in charge of the work with 12 men.

The channel appears to have a trend at this point of north-east by south-west, and towards the Fraser, has been much eroded and buried again under heavy wash, but beds of quartz gravel are seen along the trail, and near the Fraser, within the direction of this course, bars were washed for many years.

#### (B.)—BARKERVILLE DISTRICT.

##### THE CARIBOO GOLD MINING COMPANY, LIMITED.

##### *Hydraulic Elevators.*

Capital stock, £100,000. Secretary, W. B. Brough, London, England. Manager, Mr. James Champion.

This company has secured five mining leases and five patented claims on or along Williams Creek, and over \$250,000 has already been spent in preparing this property for mining. Having secured the rights to the best of Williams Creek where it enters the wide valley, opposite the former site of Marysville, and for a considerable distance up the stream towards Barkerville, it is proposed to work by means of hydraulic elevators of large capacity, all the ground, 60 to 70 feet deep, down to bed-rock, where in early days so much gold was got by drifting along bed-rock, but leaving, it is believed, a large amount of gravel above, which (while not profitable then to work with the very high rate of wages) is thought by the company to now offer with this latest method of handling gravels, a promise of good returns.

Success will depend, to a very great extent, upon the supply of water, of which a large amount will be demanded.

**Gravel.** In early days nearly all of the gravel lying on bed-rock in Williams Creek, from the Ballarat Claim up to the "canyon," was mined out, and in this mining a large amount of timbering was used which remains there to-day. Above this was gold-bearing gravel, clay and slum, and since then from 10 to 15 feet of gravel have been hydrauliced into this stream from the benches and gulches above, so that in this undertaking, it is proposed to work out all this material down to bed-rock by raising it by means of hydraulic elevators into the high sluices, by means of which all this material may be swept away to the dumping ground, which otherwise it would be impossible to move. In the preparatory work all gravel that has to be handled is run through sluices to augment the prospecting done before permanent work was begun. The writer has no information for report as to the values contained in this gravel.

**Hydraulic elevators.** Work is being started on the old end of the Ballarat claim where there will be two Campbell Hydraulic Elevators (to be installed this winter) side by side, made at the bottom of heavy castings, well welded wrought-iron piping leading up to the sluices. In the bottom will be the inlet nozzle for the water under a head of nearly 800 feet, that will direct this powerful stream of water up the pipe in the lower side of which is an opening or gate into which the gravel is run by other streams, and then elevated in the sluices by the force of the elevating jet from the nozzle. In this pipe the diameter is contracted to 12 inches at the throat, but above that the pipe is 18 inches in diameter. These elevators are set at an inclination of 30 degrees from the vertical, and it is estimated that with the head of water, 1,200 to 1,500 cubic yards of gravel, dirt, etc., can be raised per 24 hours in each elevator with 600 miner's inches or 900 cubic feet of water per minute.

In beginning this work a shaft 5 feet by 8 feet 4 inches has been sunk to bed-rock through 68 feet of gravel, etc., in which will be placed the elevators; then another inclined shaft has been sunk at right angles to the first one, down which pass the water-pipes to the bottom of the elevators. When all connections are made and the forceful streams of water turned on in the elevators, work will be begun by working the material about the top of the elevator shaft down to the gate of the elevator, to be thence raised and discharged into the sluices. (See illustrations.)

The vertical lift from bed-rock to the sluices will be 88 feet. Thus a pit will gradually be worked out about the elevators and down to bed-rock by using monitors with nozzles 3 to 4 inches in diameter to wash the material towards the gate in the elevators, and as this pit enlarges, the sluices can be extended and the elevators moved farther up the stream. Also small sluice boxes will then be placed on bed-rock and the larger percentage of the gold should be caught here as the gravel rushes toward the elevators, and timbers, boulders, etc., can be piled up on the washed bed-rock.

**Sluices.** On high trestles, 20 feet above the surface, 800 feet long, will be the sluices, in two compartments, 4 x 4 feet, paved with wooden riffle blocks; grade, 3 inches to 12 feet. This work, by means of which a large amount of material is afforded an artificial dump at a good distance from the workings, was just completed in the month of October. The top of the pipe of the elevator is let into the floor of the sluice, and then a very strongly constructed hood will be built over this discharge, as, with this head of water, the gravel, boulders, etc., will be discharged with terrific force from the pipe.

**Drainage Tunnel.** Starting at Little Valley Creek, a drainage tunnel had been run 2,750 feet, with 130 feet still to go to reach the bottom of the elevator shaft, and by this tunnel all the surface water down to bed-rock will be drained out of the workings, which otherwise would be flooded. All gravel and dirt taken out in this work was being run through sluice-boxes to catch any gold present, with reported excellent results.

**Flume.** To carry the waters of Williams Creek past these operations, a small dam was built across the creek 1,400 feet above the elevator shaft. A flume, 2,200 feet long, 6 x 14 feet, in two compartments, paved with wooden blocks, discharges near the lower end of the sluices, as shown in the illustration.

**Pipe-line.** From pressure-box at the ditch, two lines of piping, 5,000 feet each, will carry the water to the foot of the elevator under a vertical head of 792 feet. The welded wrought-iron piping, imported from England, decreases in diameter from 36 inches at the top to 18 inches at the bottom, the lower pipes being of one-quarter inch metal.

(a.) Fourteen miles of ditch have been completed to carry water from all the lakes and streams on the mountain sides tributary to Williams Creek, and reservoirs were being made on the mountains to impound all water that could be got. This ditch, 9 feet wide on the top, 4 feet on the bottom,  $2\frac{1}{2}$  feet deep, with a grade of 9.6 feet per mile, is expected to carry 2,000 inches of water.

(b.) A second but short ditch has been built to carry water from Williams Creek to supply the monitors.

This company has secured practically all the water supply available, and for a part of the season, when the snows are melting rapidly on the hills, there will be for five to six weeks an abundant amount. After that the supply rapidly decreases, and the storage reservoirs will be taxed to maintain the large quantity required by these elevators, and only one elevator it is estimated may be then run six or seven weeks.

During the coming season, operations will be begun with both elevators, when the real conditions affecting this water supply will be learned, and it will be of greatest interest, as to make such an enterprise as this profitable, a large amount of dirt must be washed, and a large supply of water throughout the season must be obtainable. It is to be hoped that this company will meet with every success, for, should the proper conditions of pay gravel and sufficient water prevail, it will take many years to mine out the ground embraced within their territory, although it will take at least two seasons to get opened up to do maximum work.

**Placer Mining.** This company has secured some placer ground, and has been working in a small way the "Eye-opener" claim, immediately opposite Barkerville, with, it is reported, indifferent results.

#### WILLOW RIVER DRIFT MINING.

Mr. Fred C. Laird has been engaged for several years on a very important work—the undertaking to reach and explore the gravels lying in the deep channel under the present Willow River—and after many difficulties and most discouraging accidents his work has now reached that point where he can determine whether gold in paying quantities exists in these low lying gravels. Should he meet with success, others will quickly follow his lead and explore other rivers and creek channels. Mr. Laird having secured five mining leases, or four miles along Willow River, sank seven holes to bed-rock with a Jetting machine across the valley of this river below where Mosquito Creek flows in, a creek from which a good deal of gold has been worked, and where every year two parties of men make good pay working while water lasts. Willow River for two or three miles above this flows through a wide valley of meadow land never prospected, and here flows in a fair size stream through a gently falling valley, with a fall of about 12 feet in 1,000.

In this cross-section the gutter was found at 102 feet, and fine gold was brought up by the machine in the gravel in each hole. A shaft was sunk here 50 feet, but the water was too much, so a tunnel was started 300 feet west of this line of holes and near the creek, and run south 620 feet to bed-rock, where a shaft 6 feet by 12 feet was raised 100 feet to the surface, and also sunk 110 feet, whence a drift was run out 485 feet to where gravel appeared in the roof. There had been some trouble before with water, as the pump was poor, but just at this juncture a fire destroyed the engine house, hoisting engine and head gear of the Cornish pump, and while a new plant and buildings were being put up, the workings filled up with water to the tunnel level.

At the time of visit the new plant was in working order and the drift was being cleared out when another delay was met with by a not serious break in the pump.

**Plant.** The plant now comprises a 50-h.p. boiler, a 65-h.p. engine for pump, and a 15-h.p. engine for hoisting. The pumps, made by Moran Bros., Seattle, are made after a rather new design, and were giving very good satisfaction. A 5-foot fly wheel, connected to engine by belting, is geared to two pairs of pump-rods of  $2\frac{1}{2}$ -inch steam piping, each of which extends down the shaft to its plunger. Thus each pair of plungers of 8-inch diameter, 24-inch stroke, discharge alternately into the 6-inch water column, of which there are two up to the tunnel. Each pair can be thrown out of gear, and in sinking one pair can be kept at work while the other is being lowered. At time of visit only one pair, at 16 strokes per minute, was required to handle the water, but the pump may run up to 34 strokes, or a discharge of 1,300-1,400 gallons per minute for the lift of 110 feet.

No provision has yet been provided for handling the gravel when brought to the surface if mining operations are begun. If this exploratory work proves to be successful, other cross-sections will be made and other shafts sunk along the river. Timber is good and abundant.

Since time of visit, on breaking into the gravel at the face of the 485-foot drift, the water has proved too much for the pumps, which have been drowned out, and as the Cornish pump is not available, new steam pumps of much greater capacity have been ordered.

#### SLOUGH CREEK GOLD MINING COMPANY.

On Slough Creek, or a creek between Lightning and Willow River, the **Drift Mining.** above company is attempting to reach the bottom of the deep channel known to exist, by bore-holes, but progress has been greatly delayed by finding that the data secured in sinking these bore-holes were not correct in some important particulars, as (a) the depth to a thick stratum of boulder-clay was found to be 50 feet deeper than stated by the man who sank the first holes, and the long drainage tunnel was thus too high, and could not drain the ground above this clay through which it would then have been comparatively easy to sink a shaft to bed-rock; (b) one bore-hole, instead of striking bed-rock, was found on drifting underground to have reached a bed of very large boulders or great masses of the slate country rock, some twenty feet long, hence the drainage tunnel to the rim rock had to be driven much further than was anticipated.

This company has acquired 5 leases or 5 miles along the valley of Slough Creek, ten miles from Barkerville, or five miles from Stanley, on Lightning Creek.

Slough Creek is a small stream meandering down through a wide level-bottomed valley, and along its southern tributaries, or Burns, Nelson and New Creek, a large amount of gold has been taken, especially from Nelson Creek, where the yield is supposed to have equalled \$3,000,000. Also a bench of gravel extends along the south side of this valley, from which the Chinese yearly extract very good pay. This company began operations by sinking a series of holes with the Jetting machine, across the valley, just below where Nelson Creek flows into Slough Creek, here practically level for 1,800 feet across. The deepest point of bed-rock, or the gutter, was found to be at 287 feet from the surface, and near the centre of the channel. To the south, or towards Nelson Creek 260 feet, bed-rock was struck at 245 feet, and 250 further at only 45 feet apparently.

The thick bed of clay overlaid by a loose, sandy gravel or slum, and underlaid by bed-rock gravel, being stated to be nearly 40 feet from the surface, to drain all this water-soaked ground above the clay, a tunnel was driven 2,200 feet and then a shaft was sunk to strike the gutter. At a depth of 84 feet the clay had not been reached and, as the amount of water and slum coming in was more than the pumps could handle, this work was abandoned.

Starting from this drainage tunnel, a drive was run south for the rim-rock and, at the point indicated by the 45-foot bore hole, were found the large angular masses of rock mentioned above, so that Mr. Hopp, working in very bad, dangerous ground—which, however, he conquered by careful, patient work and good timbering—was compelled to drive 500 feet more to bed-rock, and now it is seen that to reach the gutter of this channel a shaft at least 320 feet deep and a drive of 1,000 feet along will have to be made in solid rock before these low-lying gravels can be reached and prospected to ascertain what values they may contain.

As on Willow River, this thick stratum of clay, if kept intact, should serve to keep out the surface water and save a large amount of pumping. Thus, since 1892, 3,500 feet of drift have been driven, and the plant now consists of two 35-h.p. boilers, one 16-h.p. hoisting engine, a four plunger pump made by Moran Bros., of Seattle (now loaned to Mr. Laird on Willow River).

At the time of writing, a drive is being run to prospect a bed of gravel at the mouth of Nelson Creek from which Chinamen, years ago, are said to have taken much gold.

This property has recently passed into the control of The Incorporated Gold Mines of British Columbia, Limited; capital stock, £200,000, for which William Thompson will be engineer, and during the coming season work will be more vigorously pushed.

#### THE BRITISH COLUMBIA DEVELOPMENT ASSOCIATION.

Wm. Thompson, M. E., of London, England, has bought or bonded for this English company a number of mining leases on Williams Creek, Willow River and Slough Creek, which he is expected during the coming season to prospect by sinking, at different points, a series of



holes to bed-rock, This work will be done with the Jetting machine already mentioned, and when a cross-section has been secured of a channel, a shaft and tunnel in rock can be driven to reach and explore the gravels in the channel.

#### BIG VALLEY CREEK.

A company, of which Major C. T. Dupont, Victoria, is President, is prospecting a deep deposit of gravel on Big Valley Creek, a tributary of Willow River, 12 miles from Barkerville; but the workings were flooded, as the pumping plant was at that time inadequate to handle the water, and other pumps were being arranged for.

#### WAVERLEY HYDRAULIC MINING COMPANY.

This company—General Manager, Jno. Pomeroy, Barkerville—owning three-fourths of a mile along Grouse Creek, six miles east of Barkerville, began its first work here in 1867, by sinking a shaft and drifting; but this work not being profitable, in 1868 a drainage tunnel, 500 feet long, was begun in a canyon and driven through the slates and schists, and when the channel was entered (but above bed-rock), the large pit seen to-day was begun by washing the dirt out by the tunnel. Thus the pit, now 1,000 feet long, 200 feet wide on top, and 80 to 90 feet at the base, was advanced up this channel, but no values were got until recently, when a stratum of pay gravel, now 80 feet wide and 25 feet deep above the sluice-boxes, came in.

Water is got from Grouse Creek and carried in 1,500 feet of piping to a No. 2 monitor, under about 200-foot head, and runs for three months. The first season of profit was that of 1896, and this year expenses were paid, but a dividend was prevented by a large slide, to get rid of which, to clean up some of the last boxes in the sluice, there was not enough water remaining. This company now thinks that after many years of work the good ground is now entered, and one and a half miles of this channel yet remains to be mined.

#### NIP AND TUCK.

The Chinamen yearly clean up a few thousands from a bench of ground lying east of the "Black Jack" claim at Barkerville, and at several other places work on a small scale is carried on while the limited supply of water lasts.

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#### NOTES ON DREDGING FOR GOLD.

BY JOHN W. GRAY.

*Mining and Scientific Press, San Francisco, Nov. 13th, 1897.*

"After great effort, numerous trials, many failures and some large losses, this system of gaining gold has been evolved from crude beginnings into a systematic and satisfactory method of mining. Dredging for gold is now attracting attention and bids fair to become an established form of mining for gold. In New Zealand, where more work of this nature has been done than elsewhere, the evolution of the industry has been the work of years. The rivers upon which dredging operations are carried on are swift flowing streams, subject to frequent floods, having a considerable depth of gravel, with boulders, and with runs of pay dirt interstratified. The conditions are, therefore, not the best for economical and successful work, and it is not surprising that many failures have occurred. The runs of gold are, however, often extensive and rich, and operations carried on upon such reaches have in a number of cases given satisfactory results.

"The improved form of dredge is a double pontoon, with ladder and chain bucket arrangement between. Screens separate the coarse from the fine material. Wide sluicing tables catch the gold, centrifugal pumps supply water, and the waste material is handled by elevators. The power is usually steam, although electricity is used in a few instances, where conditions are favourable. The dredges vary in size and capacity, but are now built of large size and great strength. Twenty thousand dollars is the cost of a large dredge with all the

latest contrivances. Under favourable conditions, material has been handled without loss that only yielded a grain of gold to the cubic yard. The real cost, in actual continued working, is believed to be very much in excess of that figure where average conditions exist.

"According to the report of the Mines Department for 1896, the gold saving appliances of the dredges operating upon the Clutha River and tributary streams, were imperfect, and the work was considered remunerative only because of the richness of the ground worked. No information as to yield of gravel or cost of work is given, and secrecy is maintained by those operating dredges regarding yield and value of gravel, cost of work, and all the details of their operation. One dredge on the Clyde side of the Shotover, working to a depth of 20 feet below water level lifted forty tons per hour when operating. Six men were required to work day and night, and three tons of coal were consumed per day. According to the New Zealand Mining Record, eleven dredges, during the four weeks ending July 24th, 1897, secured \$29,548, working expenses being about 21 per cent. of the total yield. This would give an average for the month of \$2,686 for each dredge. Nothing is learned regarding value of operations, amount worked, or expense of working, save as percentage of total yield. This is an unsatisfactory and misleading way of reporting results of operations, and gives no information that is of value to those interested in such matters. According to the Government expert of the Mines Department, the dredges have, as a rule, been under the management of men with mechanical skill only. The gold, it was thought, would save itself if the dredges handled the material. Many of the failures are attributed to the fact that the men in charge were not familiar with or skilled in gold-saving operations, and it is believed that has been the prime cause of nearly all failures where the conditions for operating were favourable.

"So far in this country, with a few exceptions, dredging operations for gold have not been financially successful. From crude beginnings, however, the machines have been rapidly improved and perfected until now, in some localities, dredges believed to be the most complete yet constructed, are being put in operation, and results are promised, not yet attained, in the way of economical working and high percentage of saving. During the last few years, a number of dredges have been operated in California, British Columbia, Idaho, Montana and Colorado, but with poor success. Very few proved themselves capable of paying their way. Some of the machines were faulty within themselves, others were entirely unable to cope with the swift currents and large boulders of the streams upon which they were operated. This latter is said to have notably proved the case with the dredges tried upon the Fraser and Quesnelle Rivers.

"Dredging operations upon Grasshopper Creek, near Bannock, Montana, are now carried on successfully upon a large scale. The Upper Sacramento River in this State, has a dredge doing profitable work, and in a small way, dredging is successful upon the Klamath. A dredge upon that river, composed of two flat boats with a large steel scoop between, is able to cut and hoist the gravel and soft bed-rock, and to handle boulders of from four to six tons weight. The dredge is run day and night, has a 25-horse-power engine, and requires three men for each shift. In gravel 10 to 25 feet deep, 400 cubic yards can be handled every twenty-four hours. Cost of dredge, \$8,000.

"A large dredge of the chain-bucket variety is operating in northern Mexico, in a dry country, where there is little water. The actual capacities of these machines are 60, 100, and 150 yards per hour.

"Perhaps the most interesting dredge yet brought to the notice of the public is one lately built by the Risdon Iron Works, of San Francisco, and now operating upon the Yuba River, near Smartsville, Cal. It is of the elevator or chain-bucket type, 96 feet long, composed of two pontoons separated by a space 5 feet in width, in which is operated the ladder carrying the buckets. One man controls the dredge by means of a power winch with six drums. Four drums carry lines from the corners of the dredge to anchorage on shore—one a head line and one the ladder line. The machine is to dredge to a depth of 45 feet, and is said to have a gross capacity of 93 cubic yards per hour. The material discharges from the buckets into revolving and perforated screens. This segregates the large material, which is then conveyed away by the tailings elevator. Water (3,000 gallons per minute) is supplied to the revolving screens for washing and sluicing purposes by a centrifugal pump, and the fine stuff falls through the holes in the screen into a distributing box, from which it passes to a set of gold-saving tables, and thence to a flume. The tables are covered with cocoa matting and expanded metal. The top tumbler of bucket chain is operated by a vertical compound condensing engine indicating 35-horse-power, which also operates the pump. It is claimed for

the dredge that for any ground not deeper than 60 feet below water level or more than 20 feet above, and which contains boulders of not more than one ton weight, the material can be handled at from 3 to 5 cents per cubic yard. If the capacity of the machine is given without deduction for water raised, imperfect filling and general delays, and the increase in the volume of the gravel when broken up in filling the buckets, the actual working capacity would be less, and from these causes and the losses from wear and tear, breakages and repairs, the cost of operating would be increased. The cost of the dredge, complete, upon the river is said to have been \$25,000.

"In the evolution of the dredger into the elevator or chain-bucket machine, now the popular form, the various kind of dredges were given trials. The dipper dredge is not adapted to dredging for gold, because it disturbs the gravel in the act of digging, and some of the gold is lost. With agitation of the gravel the gold soon settles, and is not recovered.

"It is also very difficult, if not impossible, to construct a dipper dredge that is watertight. Another objection is that the material is supplied intermittently, thus making necessary certain undesirable arrangements for supplying the material in a continuous flow to the gold-saving tables. The same objections apply with greater force to the clam-shell form of dredge. It is by no means watertight, and loses most of the gold in the act of dredging and bringing up the gravel. The objections would seem not to have the same force if applied to hard cemented gravel, or to gravel with sufficient clay or other binding material to make it consistent. It is well to remember that these forms of dredges are, in many positions, economical of operation.

"The hydraulic dredge has had fair trials and proved a failure. Large stones greatly lessen the efficiency of this form of dredge, and numerous boulders hamper the pumping work. The suction force being intense, near the pipe, and decreasing rapidly a short distance away, causes the sand and gravel to be carried off, leaving the gold behind.

"A centrifugal pump is, therefore, of little use to catch coarse gold and clear a hard uneven bottom. Cutters do not remove the trouble, since the gravel is disturbed by the cutting, and the gold is separated therefrom.

"These objections would not obtain under certain conditions, and it would seem quite possible that conditions might be found existing where the suction dredge might be arranged to do good work. A dredging company is now constructing at Seattle, two dredges of the suction type, to operate upon the Yukon River. This would indicate that there are those who believe that deposits occur in and along that river, which can be successfully worked in this way.

"The chain-bucket machine, the popular form for operating under average conditions, is a combination of the following elements:—An excavating apparatus which clears the bottom and handles the material with little agitation, and slowly and continuously delivers a regular quantity of gravel to the gold-saving appliances; a revolving screen to receive and wash the material, and separate the coarse from the fine; an elevator or contrivance for carrying off the coarse gravel and stones; a gold-saving arrangement or tables, over which the fine material passes and upon which the gold is caught; a pumping apparatus to supply water for washing and sluicing.

"The proper capacity of a machine seems to be regulated by the capacity of the gold-saving appliances. The table should be as wide as possible, with frequent drops, and the fine material should be distributed over the tables in a thin film. The tables are covered with plush or cocoa matting, and sufficient water supplied to keep the material clear. The material should be supplied evenly, continuously, and regularly to the tables. Care and attention are required to catch the fine gold. A disregard of the foregoing, results in great loss, more particularly in the fine gold. Mechanical skill is required to properly design and construct a dredge, and the care of a competent mechanic is necessary to see that the machine is kept in order and economically operated.

"This saving of gold, however, is what makes dredging operations a commercial success. A man skilled in these matters should be in charge of mining operations. Dredges should be built of determined capacities, and should be designed to suit the conditions under which they are operated. Careful examination and investigation of the ground to be worked should be made beforehand, and the surrounding conditions studied, and it goes without saying that these matters require engineering skill and experience.

"The field for dredging for gold seems large. Where the proper conditions exist, it is a system which commends itself, and which gives promise, in competent hands, of being an



CEMENTED GRAVEL, HORSEFLY MINE.

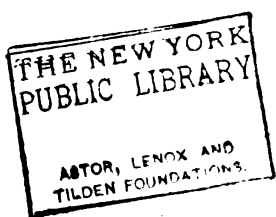


HYDRAULIC ELEVATOR.



HORSEFLY MINE.

VIEWS ON HORSEFLY RIVER, CARIBOO.



economical method of mining. There is probably a very large extent of country where dredging for gold will be carried on profitably. Ground need not be in a river, if there is seepage water sufficient to float the dredge and supply water for the saving of the gold. Dredging requires little water as compared with that required for sluicing and elevating, and this water can in many dry localities be supplied at small expense, where a supply for hydraulic work or elevating would cost a very large sum or be impossible at any cost. Any power suitable for driving the prime motors can be utilized to run the dredge. Indeed, it would seem as if a system of mining was about to be perfected which may make possible the profitable working of many deposits not easy to be worked by other methods, and which may, in many instances, solve problems regarding the successful working of deposits which hitherto have seemed most perplexing, and even impossible of solution. Some doubt exists as to possible economical dredging operations under water of torrential streams. The strong currents, frequent floods and many large boulders found in the channels of such streams make the working of the machines difficult and costly. This would not be so much the case in the long stretches of less current, nor would it be so at all in the valley-like reaches in the lower portions of such streams, nor in the wide, flat portions of country where the streams enter the plains.

"Although dredging for gold as a method of mining has passed the experimental stage, there is a great lack of reliable data regarding all details of operations and the actual cost of real and continued working. For this reason it would seem especially desirable that all projected enterprises, in the way of dredging work, should first receive the most careful investigation, and that afterwards all operations undertaken should be under the direction of skilled and experienced men."

### CASSIAR DISTRICT.

Since the issue of the Report of 1896, a year ago, the discoveries of placer gold on the Klondike and its tributaries in Canadian Yukon have become known throughout the world, and now is being seen a wild rush of prospectors, investors, speculators and adventurers into this northern region, led on by the desire for gold. In all probability this stampede will surpass any other of the century, as from all quarters of the globe come reports of men leaving for this Arctic Eldorado.

The great northern reaches of British Columbia comprise the districts of Cassiar and Cariboo, of which we know very little, excepting of certain isolated portions, and great areas have never been explored for the precious metals; but the Omineca and Cassiar have in the past produced considerable placer gold, and, it is claimed, quartz untested and unworked is to be found in these districts.

This year will see the beginning of a great influx of prospectors, as many, instead of going farther north into the Yukon, are preparing to enter and prospect Cassiar and northern Cariboo, and parties will be entering by all known means of ingress, and by every route. The interest and excitement now aroused, the building of two lines of railroads, and the opening up of new roads and trails, are now about to effect the exploration of a great amount of territory hitherto almost totally unknown.

As applications for reports, information, etc., concerning this part of the Province are now becoming very numerous, it has been thought wise to embody in this report all authentic information available, and as the reports by Dr. Dawson, Dr. Selwyn and Mr. McConnell, who have explored parts of this district, are the most authentic, extracts from their reports in the "Reports of the Geological Survey of Canada" are herein collected, so that this valuable data may be the more easily available.

Several routes will be traversed.

**Routes.** (a.) *Via* Edmonton, in the N. W. T., up the Peace, Finlay and Parsnip Rivers. This route will have to be opened up to a very great extent by those new entering, and is more fully described below.

(b.) From Ashcroft to Quesnelmouth, thence by trail into the Omineca District, and on to the Stickine River, or by water and portage to the waters of the Parsnip and Finlay Rivers.

(c.) By the Skeena River to Hazelton, and thence by trail into the Omineca.

(d.) By the Stickine River with steamers to Telegraph Creek or Glenora, whence the northern part of Cassiar can now be reached by trails and water-ways, and in another year by two lines of railroads.

The Dominion Government has granted a charter to Messrs. McKenzie and Mann to construct a railroad from Telegraph Creek or Glenora, at the head of navigation on the Stickine, to Teslin Lake, to be completed by September 1st, 1898. This line may be extended to a point in British territory on the Pacific seaboard. From Teslin Lake steamers properly constructed for these waters can run through to Dawson City.

The Provincial Government has granted a charter, with land concessions, to the Cassiar Central Railway Company, and this company is preparing to build a railroad from Glenora to Dease Lake, and is also preparing to offer very favourable inducements to prospectors entering this part of Cassiar to search for gold, more especially gold-bearing quartz ledges.

Hence with all this work soon to be in progress before so very long, far greater means of access will be afforded, and it will be possible to get in supplies, machinery, etc., and at much more reasonable costs. The following information is now appended as excerpted from the Geological Reports.

These reports of Dr. Dawson and Mr. McConnell will be found to be very interesting and valuable, and the fulfilment now of predictions made ten years ago by Dr. Dawson well repay his arduous labours in this little-known land.

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## CASSIAR.

### (A)—“MINERAL WEALTH OF BRITISH COLUMBIA.”

BY DR. G. M. DAWSON, 1888.

“The Cassiar District includes the most northern region of gold mining in British Columbia, and some of the creeks which have been worked lie to the north of the 60th parallel, or northern boundary of the Province. Dease Lake, latitude 58° 30', longitude 130° may be considered as the central point of the district. This lake is the source of the river of the same name, which is a tributary of the Liard, itself a branch of the Mackenzie. Gold had already been found and worked on the river bars of the Stickine for eleven years, when Thibert and McCullough, coming from the east reached and discovered the rich deposits of the Liard drainage basin in 1872. The miners, who soon flocked into the district, came by way of the Stickine River, though a route for cattle and pack animals was also opened overland from Fraser Lake. Dease, Thibert and McDame Creeks and their tributaries have proved the richest, and a large quantity of gold has been obtained from them, though the yield has, of late years, become comparatively inconsiderable. The region presenting identical or analogous characters with that portion of it which proved to contain these rich deposits is very extensive, and much the same remarks which have been made in regard to the exploration of the Omineca District apply here also, though the cost of living in Cassiar has usually been somewhat more moderate. The country is generally wooded and mountainous and difficult to traverse, but a waggon road or even a railway might, without difficulty, be constructed from the head of navigation on the Stickine to Dease Lake, and this will, no doubt, eventually be accomplished, as discoveries of veins containing the precious metals are confidently to be anticipated. Argentiferous galena has already been found, and the rough, unworn character of the gold on some of the creeks leads to the belief that its source might be ascertained without great difficulty. “Coarse” gold is found locally on that part of the Stickine above Telegraph Creek, and the circumstances appear to indicate the existence there of an old channel above the present river-level, but covered by massive flows of basalt of Tertiary age.

“Difficulties have been encountered in this district from permanently frozen soil met with in mining, but when once the covering of forest and moss had been cleared off by fire these disappear.

"The gold-yield of the Cassiar District, from the commencement of mining to the present date, so far as known is shewn in the following table, which, however, gives no returns for the earlier years of mining, when work was confined to the Stickine River :

1873.....	Not known.
1874.....	\$1,000,000
1875.....	830,000
1876.....	556,474
1877.....	499,830
1878.....	519,720
1879.....	405,200
1880.....	297,850
1881.....	198,900
1882.....	182,800
1883.....	119,000
1884.....	101,600
1885.....	50,600
1886.....	63,610
1887.....	60,485
1888.....	43,325
Total .....	\$4,929,394 "

(B.)—DR. G. M. DAWSON'S REPORT ON "EXPLORATION OF THE YUKON, ETC.," 1887.

**Routes.** "Dease Lake can be reached with difficulty from the coast by ascending the Stickine River 138 miles to Telegraph Creek, and thence by pack train 62½ miles to the lake. The country north-west of the lake and west of Cassiar Range to the head of Teslin Lake and Tagish Lake could be entered by Taku Inlet and river, which can be ascended in canoes for 80 miles. These routes are fully described in subsequent pages."

**Topography.** The following notes on the topography of Cassiar District and neighbourhood are taken from Dr. Dawson's Report on an Exploration in the Yukon District, N. W. T., and adjacent northern portion of British Columbia, 1887 :

**Drainage.** "The region traversed, including the extreme northern part of British Columbia and the southern part of the Yukon District, is drained by three great river systems, its waters reaching the Pacific by the Stickine, the Mackenzie (and eventually the Arctic Ocean) by the Liard, and the Behring Sea by the Yukon. The eastern part of the region is divided between the two first named rivers whose tributary streams interlock, the Stickine making its way completely through the Coast Range in a south-westerly direction, while the Liard on a north-easterly bearing, cuts across the Rocky Mountains to the Mackenzie Valley. The watershed separating these rivers near Dease Lake has a height of 2,730 feet, and both streams may be generally characterized as very rapid.

**Watershed.** "To the north-westward branches of the Stickine and Liard again interlock with the headwaters of several tributaries of the Yukon, which here unwater the entire great area enclosed on one side by the Coast Range, on the other by the Rocky Mountains. As the general direction of this line of watershed is transverse to that of the main orographic ridges of the country it will probably be found when traced in detail to be very sinuous. The actual watershed, between the Liard and Pelly, was found to have an elevation of 3,150 feet, but it is no doubt much lower in the central portion of the region between the Rocky Mountains and Coast Ranges.

"To the north of the Stickine at least one other river, the Taku, cuts like it completely across the Coast Range, but this basin is comparatively restricted and little is yet known of it.



**Courses of Rivers.** "It will be noticed that while the several branches of the Yukon conform in a general way to the main orographic axis, the Stickine and Liard appear to be to a large degree independent of these, and to flow counter to the direction of three mountain ranges.

**Relief of the Region.** "The region as a whole, being a portion of the Cordillera belt of the west coast, is naturally mountainous in general character, but it comprises as well important areas of merely hilly or gently rolling country besides many wide, flat-bottomed river valleys. It is, moreover, higher and more mountainous in its south-eastern part. That drained by the Stickine and Liard, and subsides gradually, and apparently uniformly to the north-westward; the mountains at the same time becoming more isolated and being separated by broad tracts of low land. The general base-level, or height of the main valleys, within the Coast Ranges, thus declines from about 2,500 feet to nearly 1,500 at the confluence of the Lewis and Pelly Rivers, and the average base-level of the entire region may be stated as being a little over 2,000 feet.

**Trend of Ranges.** "Disregarding minor irregularities, it is found that the trend of the main mountain ranges and ridges shown throughout the entire region here described a general parallelism to the outline of the coast. In the south-eastern and more rugged tract, the bearing of such ranges as are well defined is north-west by south-east, while beyond a line which may be drawn between the head of Lynn Canal and Frances Lake the trend gradually changes to north-west.

**Coast Ranges.** "The Coast Ranges, with an aggregate average width of about 80 miles, the whole of which is closely set with high, rounded or rugged mountains, constitutes the most important orographic uplift in the entire region, and here reproduces geographically and geologically the features characteristic of it in the more southern portion of British Columbia. Notwithstanding the great width of the Coast Ranges, it is not known that any of their constituent mountains attain very notable altitudes, but it is probable that a great number of the peaks exceed a height of 8,000 feet. These ranges are composed of very numerous mountain ridges, which are not always uniform in direction and, so far as has been observed, there is no single culminating or dominant range which can be traced to any considerable distance.

**Rocky Mountain Ranges.** "The mountain axis next in importance to that of the Coast Range is that which forms the water-parting between the Upper Liard and Yukon on the one side, and the feeders of the main Mackenzie River on the other. This represents the north-western continuation of the Rocky Mountains proper. It forms, as far as has been ascertained, the culminating range of a number of more or less exactly parallel ridges and summits in it, attain heights of from 7,000 to 9,000 feet.

**Cassiar Range.** "A third notable mountain axis, which I have designated the Cassiar Range, is cut through by the Dease River in its upper course, and further to the north-westward appears to form the line of water-parting between the tributaries of the Upper Liard and those of the branches of the Yukon. Peaks near the Dease in this range exceed 7,000 feet, but it is probable that none such exceed 8,000 feet, and that the range in general may become lower to the north-westward.

"In the north-western and more elevated moiety of the region the mountain ranges and ridges are in general lower, and become discontinuous and irregular or, while retaining a general parallelism, assume an overlapping or echelon-like arrangement.

**Granite Rocks.** "In each of these mountain chains above described granitic rocks appear in greater or less force. In the intervening and subordinate mountain systems of the south-east granitic axis are not found, and do not exist as permanent features.

**Effects of the Glacial Period.** "The topographical features of the entire region here described have been considerably modified by the events of the glacial period, and the changes produced at that time have more particularly affected the drainage basins and the courses of the various streams. The valleys and lower tracts of country are now, more or less, completely filled or covered by extensive deposits of boulder clay, gravel, sand and silt laid down during that period. To these deposits are due the flat floors of the large valleys, and also to a great extent the appearance which the more irregular mountain regions present of being partly submerged in level or rolling plains. Many changes in direction of flow in river valleys have doubtless also been produced during this period.

The general result has been to produce systems of inconsequent drainage wherever the natural slopes of the country are easy and the limiting ranges irregular. Most of the rivers at the present day have done little more than cut out new channels in the glacial debris, touching only here and there upon the subjacent rocky floor.

#### NAVIGABLE WATERS AND ROUTES OF TRAVEL.

**Navigable Rivers.** "The numerous large and important rivers by which the Yukon district and the adjacent northern portion of British Columbia is intersected constitute the principal routes of travel, and during the summer routes render water communication comparatively easy. The Stickine is navigable by stern-wheel steamers for a distance of 138 miles. This constitutes the travelled route to the Cassiar mining district. A trail was at one time opened from Fraser Lake overland to Dease Lake by which cattle were driven through, but of late no travel has occurred on it. The Dease River can scarcely be considered as navigable for steamers, though constituting a fairly good boat route. The Upper Liard and Frances rivers, above the mouth of the Dease, are also passable for large boats with occasional portages, but not so for steamers. The difficulties of the lower Liard, however, are such as to render it an undesirable route, even for boats, and scarcely suitable as an avenue of trade between Cassiar and the Mackenzie. Numerous tributary streams in this district may also be ascended by boat or canoe for considerable distances, though with many interruptions from rapid and bad waters.

**Railroad Route.** "Communication may easily be established by railroad from the mouth of the Stickine to the centre of the Omineca District and beyond, when this shall be called for, and it is probable also that this district might without difficulty be connected by rail with the more southern portions of British Columbia by one or more routes, of which the main outlines can already be indicated. Following the river valleys, by a route practicable for a railway from Rothsay Point, at the mouth of the Stickine, to the mouth of the Dease, the distance is found to be 330 miles. Thence to Fort Simpson, on the Mackenzie, is a further distance of 390 miles, making the total distance by this route, from the Pacific to the navigable waters of the Mackenzie, about 720 miles only.

**Taku River.** "Little is yet known of the Taku River, but the Indians ascend it in canoes to a point at a distance of about eighty miles from the head of Taku Inlet, and Indian trails lead south-eastward from this vicinity to the Tahl-tan eastward to Teslin Lake, and north-eastward to the lake near the head of the Lewes. From what has been ascertained of these, it is probable that it would not be difficult to construct a trail suitable for pack-animals, if not a waggon road, from the vicinity of the head of navigation on the Stickine, to those lakes connecting with the navigable waters of the Lewes.

**Yukon Tributaries.** "The rivers draining the Upper Yukon basin, have in general lower grades, and afford better navigable waters than those above referred to, and in consequence likely to prove of greater importance in connection with the exploration and development of the country. The distance to which they may be respectively ascended by boat or canoe has as yet been determined in only a few cases.

"It may, however, be stated that the Yukon is continuously navigable for small steamers from its mouth, on Behring Sea, following the Lewes branch to Miles Canyon; thence after an interruption of about three miles, to the head of Bennet Lake and to an additional considerable, though not precisely determined distance, by the waters extending south-eastward from Tagish Lake. The Teslin River is probably navigable for stern wheel steamers for 150 miles or more from its mouth, while the Tahk-hequa and Big Salmon Rivers may probably both be ascended by steamer of the same class for some distance. From the site of old Fort Selkirk, again, the Pelly River might be navigable by small steamers of good power, to within about 50 miles of the site of old Fort Pelly banks, and the Macmillan branch is also navigable for a considerable though not ascertained distance. The same may be said of the Stewart River, but White River is, so far as known, very swift and shoal.

"The total length of the waters which may be utilized for navigation by light steamers on the main river and its branches to the east of the 141st meridian or Alaskan boundaries, measured in straight lines of 50 miles, is therefore at least 1,061 miles, and following the sinuosities of the various streams would be very much greater. This does not include the Porcupine River, and, with the exception of the single break referred to on the Lewes, form a

connected system, all parts of which lie to the east of the above meridian. If the upper portion of these rivers, above the first obstacles to such navigation, were included, the total here given would doubtless be greatly added to.

"At the present moment, these routes of access to the Yukon district are employed (1) that of the portage by the Chilcoot Pass from the head of Lynn Canal to the navigable waters of the Yukon; (2) that from Peace River, near its confluence with the Mackenzie, by portage to La Pierre's house on a branch of the Porcupine; (3) from Behring Sea by the main river. The first is almost exclusively used by the miners, the second is employed only by the Hudson Bay Company, and the last is that of the Alaska traders.

**Stickine River.** "Since the year 1873, when the placer gold mines of Cassiar were first developed, the Stickine River has become a somewhat important avenue of communication from the coast to the interior of the northern part of British Columbia. Like the Fraser, the Skeena, the Naas, and several other small streams, it rises to the east of the broad belt of mountains which constitutes the Coast Range, and cuts completely through this belt with a nearly uniform gradient. In size and general character, the Stickine closely resembles the Skeena, which reaches the coast 200 miles farther south. It is navigable for stern-wheel steamers of light draught and good power to Glenora, 126 miles from Rothsay Point at its mouth, and, under favourable circumstances, to Telegraph Creek, 12 miles farther.

"Above Telegraph Creek is the 'Great Canyon,' which extends for many miles, and is quite impassable either for steamers or boats, though traversed by miners in winter on the ice. The headwaters of the Stickine are unknown, but lie for the most part to the south of the 58th parallel of north latitude, in a country said to be very mountainous, interlocking there with northern branches of the Naas and western feeders of the Black or Turnagain River, a tributary of the Liard. From Telegraph Creek, the head of navigation, a pack trail 62½ miles in length, constructed by the British Columbian Government, follows the valley of the Stickine, generally at no great distance from the river, and eventually crosses from the Tangilla, or third north fork, to the head of Dease Lake, which may be regarded as the centre of the Cassiar mining district. This route has long been known to the Indians, the Stickine having been to them, from time immemorial, an important avenue of trade, by which, as by the Skeena, the coast tribes penetrated a considerable distance inland.

**Current.** "The current of the navigable portion of the Stickine is swift throughout, but there are no rapids properly so called, though the Little Canyon (75 miles from the mouth) forms a serious impediment to navigation when the river is at its highest stage in June or July, in consequence of the great velocity of the current in this narrow and rocky, though deep, gorge. Near the mouth of the river, the current scarcely impasses two miles an hour, but it increases as the river is ascended, till it attains a rate of six to seven miles in many places, the swifter water being chiefly met with above Little Canyon. The average rate of flow of the navigable portion of the river must be about five miles an hour.

**Navigation.** "Stern-wheel steamers for the navigation of the river should have good engine power, and should draw not more than four feet of water when loaded. Under ordinary circumstances, the ascent of the river to Telegraph Creek, with a suitable steamer, occupies about three days, and it is generally necessary to carry a line ashore at a few places. The extensive flats near the mouth of the river render it necessary to enter it about high tide. A considerable proportion of the traffic is carried on by Indians with canoes; the Stickine Indians are very expert in all the necessary operations of tracking and poling in swift water.

**Iskoot River.** "The Stickine is joined by some important tributaries, the Iskoot or Skoot, which flows in from the eastward about 35 miles from the mouth, or just within the locally culminating range of the Coast Mountains, is known to be navigable for some distance by canoes, and one branch is said to head not far from the extremity of Portland Canal to the southward. By following this river to its head and there making a portage, the Indians are reported to be able to reach the Naas River without difficulty. The Iskoot has been prospected by a few miners, but apparently without any notable result, though the Indians report the occurrence of coal.

**Scud River.** "About seven miles below the Little Canyon, the valley of the Scud River opens to the east. Some gold has been found by prospectors on this stream, but no workable placer deposits.

**Clearwater River.** "Six miles above Klocchman Canyon, 14 miles above Little Canyon, the Clearwater River enters the Stickine on the west side by several mouths. This is a stream of considerable size and is navigable for canoes for some distance.

**First Fork.** "The first south fork joins the Stickine about 1½ miles below Telegraph Creek. It is a large turbid stream and for a number of miles from the main river flows in a rough narrow gorge, between high hills and mountains. Further up, according to the Telegraph Exploration Sketch, it is bordered by level partly timbered terraces or benches.

**Telegraph Creek.** "Telegraph Creek is an inconsiderable stream which falls rapidly to the river through a narrow rocky cliff in the bordering hills of the right or north-west bank of the Stickine. The little town of Telegraph Creek occupies the narrow delta of the stream and the lower terraces bordering it on both sides. Glenora, 12 miles below Telegraph Creek and on the same side of the Stickine, consists of a single row of houses built along the edge of the river at the foot of a steep bank.

**Glaciers.** "The glaciers constitute one of the most remarkable features of this part of the Stickine Valley. There are a number of these on both sides of the river in its lower part, but form only a special importance, all of which are situated to the west of the river and all but the first on the eastern slope of the most massive central ranges of the mountainous region. The first or little glacier fills a high valley on the north side of the river, about 10 miles from its mouth. The next, and most important glacier, is that universally known on the river as the Great Glacier. The high snowfields from which this glacier must take its rise are not seen from the river, the glacier entering the wide valley of the Stickine nearly at right angles, through a break in the mountains two to three miles distant from the river bank. Before entering the Stickine Valley the glacier has a width estimated at from one-half to three-quarters of a mile, but upon freeing itself from the bordering mountains immediately expands in a fanlike manner, its actual front upon the river being from three to three and a half miles in width. Ten miles above the Great Glacier, and also on the west side of the valley, is the Dirt Glacier, so named by the miners because of the great quantity of rocky débris with which its surface is covered. This is much smaller than the last, bearing a width estimated at a quarter of a mile, but possibly greater than this. Like the Great Glacier, it comes quite down on the river flats.

"The last important glacier, 16 miles still further up the river, is the Flood Glacier. This also comes down to the level of the river flats, but does not closely approach the river. From the valley of this glacier a great rush of water occurs almost every year towards the end of summer. This, no doubt, arises from the blocking by the glacier of the mouth of some lateral valley in which a lake is formed and, from time to time, breaks through the glacier dam. The quantity of water thus liberated is so great as to raise the river from a low stage to half-flood level for a short time. There is a large quantity of débris also on this glacier, though less than on the last.

**Cassiar Trail.** "The trail from Telegraph Creek to the head of Dease Lake was opened by the Government of British Columbia, 1874. It has since been kept in a fair state of repair, and is a good route for pack animals. It follows the north side of the Stickine and Tangilla valleys, and is 62½ miles in total length. The same important valley which is occupied by the Stickine below Telegraph Creek continues in a north-eastward direction to Dease Lake, the main stream of the Stickine entering it from the southward, about midway between these two points.

**To Tahl-Tan.** "On leaving Telegraph Creek the trail makes a steep ascent to the level of a broad terrace, and runs along at a considerable height above the river and often at some distance from it, till it descends again at 11 miles to the valley of the Tahl-tan or First North Fork, near its mouth. The main valley of the Stickine is here about four miles in width, and is bordered by high hills and by mountains of rounded forms, those to the north often nearly bare, while those on the opposite side are generally either wooded or strewn, where fires have passed, with burnt logs. The river occupies a canyon with precipitous banks, often 300 feet high, which has been cut in the bottom of this great valley. It is very rough and rapid, but there are no true falls. Terraces are well developed at several levels on both sides of the river which is frequently bordered by vertical basaltic cliffs. . . . The country traversed by the trail between Telegraph Creek and the Tahl-Tan is wooded only in patches, the trees being chiefly black pine and aspen.

**Tahl-Tan.** "The Tahl-tan River is crossed near its mouth by a good bridge. It is a large, rapid stream which rises about 30 miles to the north-westward. Its valley is narrow and almost canyon-like where it reaches the Stickine, and has cut through basaltic flows and heavy underlying gravel deposits to a depth of about 150 feet, though its right bank, just above the crossing, is composed of the older rocks. Gold mining was, at one time, carried on successfully for some miles up the Tahl-tan valley.

**Tooya.** "The distance from the Tahl-tan to the Tooya or Second North Fork is about six miles. For about half this distance, to Ward's house (now like other places of call along this route, abandoned), the trail runs near the Stickine River, the immediate valley of which still continues to be occupied by basaltic flows. The trail then turns away from the river and cuts across a high point to the Tooya, the highest terrace level crossed being about 1,000 feet above the river. The Tooya valley, where it is crossed by the trail, is a great gorge about 600 feet in depth, cut out through the terrace deposits. The river, which is spanned by a small bridge, is a wild torrent, almost a series of cascades. A lake of considerable size is reported to exist on the upper part of the river.

"About a mile beyond the Tooya, on the summit of a wide, undulating plateau, is Wilson's house. From here to Cariboo Camp, about 12 miles, the trail crosses an extensive high terrace or plateau which is generally wooded with aspen, black pine and white spruce of fair growth. A few very small streams which flow toward the main valley are crossed, but the river is generally some miles distant and scarcely visible from the trail. The Tooya valley is here said to run nearly parallel with the main valley of the Stickine and at no great distance from it, but is invisible from the trail. About midway between Wilson's and Cariboo Camp the Stickine, or Too-dessa of the Tahl-tan Indians, coming from the southward, enters the main valley cutting through the bordering mountains in a narrow canyon which the Indians report impassable. Their route to the upper waters of the river crosses the mountains to the west of the canyon.

**Tanzilla.** "The trail reaches the edge of the valley of the Tanzilla or third North Fork, about a mile south-westward from Cariboo Camp. This valley is cut out to a depth of 450 feet below the level of the plateau, and is about a mile in width from rim to rim. The sides show evidence of extensive land-slides, both old and recent. The river is a comparatively small, though swift and muddy stream, with an estimated width of 180 feet, and depth of about 3 feet. From Cariboo Camp to the vicinity of Dease Lake, or for about 26 miles, the trail runs along the north-west side of the Tanzilla. The valley of the stream gradually loses its depth. The mountains which extend to the south-east of the river here become higher than before, and take the form of a well marked range, which is known to the Indians as Ho-tai-luh. Swampy spots become frequent. A great part of the forest all along this portion of the valley has been destroyed by fire.

"Opposite the head of Dease Lake, the Tanzilla turns off abruptly. The main valley turns northward through a right angle, and becomes continuous with that of Dease Lake. The distance from the head of the lake to the Tanzilla at the nearest point, is about 3 miles. The height of land is about 70 feet above the lake, or 2,730 feet above the sea, and constitutes the watershed between the Arctic and Pacific Slopes.

**Dease Lake.** "Dease Lake has an elevation of 2,600 feet above the sea, and lies nearly due north and south on the 130th meridian. It has a total length of  $24\frac{1}{2}$  miles, with an average width of rather less than one mile, being somewhat narrower at the northern than at the southern end. Dease Creek, on the delta of which is situated Laketon, the chief place of Cassiar District. It is also the most important, as being that on which gold is still worked to a limited extent. A certain amount of business is still carried on here, and it is the head-quarters of the Gold Commissioner. At Porter's Landing, on the west side of the lake, near its north end, goods are landed for Thibert's Creek. A small steamer on the lake is employed in making occasional trips up and down the lake with supplies. The country about the lake is everywhere wooded, though trees large enough for lumber are found only in sheltered valleys, or on low land. It is not roughly mountainous, though several prominent peaks occur. (Geol. Survey Report B., 1888, Dr. Dawson).

**Dease River.** "From Dease Lake the general course of the river, disregarding minor flexures, is N.  $50^{\circ}$  E. for 47 miles, to a point near the valley of Rapid River. Here, before it has fed itself from the Cassiar Range, it turns nearly at right-angles to a bearing of N.  $15^{\circ}$  W., which it maintains for 31 miles; thence it again turns for a second time through a right-angle to a course of N.  $55^{\circ}$  E., which it follows to its junc-

tion with the Liard. Its entire length \* \* \* following all the sinuosities of the stream, is 180 miles \* \* \* The river from Dease Lake to the Liard may easily be descended in two days, but the ascent is a comparatively slow process, depending much on the height of the water and when the bars and benches are not bare, for tracking is a tedious affair.

"On leaving Dease Lake the river is a small stream, estimated to average from 100 to 150 feet only in width, with a general middle depth of about 3 feet. It is extremely tortuous and rather swift, meandering in a wide flat valley. At about 8 miles from the lake, it may be said distinctly to enter the mountains, the valley at the same time gradually narrowing and becoming bordered by mountains from 4,500 to 5,000 feet in height. At about 13 miles from Dease Lake it expands into a little lake about a mile and three-quarters in length, and between this and the mouth of Cottonwood Creek it flows through three more similar lake-like expansions. These lakes constitute somewhat serious impediments to navigation, as they freeze over in the autumn long before the ice takes in the river and remains frozen till late in the spring.

"Dease River rapidly increases in size, and after the lake is left soon doubles its volume, owing to the number of affluent streams of which Cottonwood Creek is the first, which may be called a river. This stream occupies an important valley which may be observed to run for many miles in a north-westward direction, bordered by continuous high ranges. It is remarkable that no paying deposits of gold have been found either on this or on Eagle River, which enters the Dease from the south, about 4 miles further down. Eagle River also flows between high mountains, and its valley appears to be parallel to and analogous with that occupied by Dease Lake.

"Immediately below the mouth of Cottonwood Creek, is Cottonwood Rapid, not a formidable one or at all dangerous to run with ordinary care. The river below Cottonwood Creek runs nearly due east, and for about 10 miles with a rather strong current. It then turns more to the northward, and after making several large flexures reaches Sylvester's Landing at the mouth of McDame Creek in about 8 miles. In this reach the current is slack, and the river averages 300 feet in width. The flat land of the river valley is rather wide in this part of its length, but the mountains to the north and south are high and bold, many of the summits ranging from 6,000 to 7,000 feet. The lower slopes of the mountains are usually light and in general thickly wooded, but their higher parts are treeless, and from the quantity of snow borne by them in June must retain some snow throughout the summer.

#### **Sylvester's Landing.**

Creek, also a post for Indian trade, and there are here a few log cabin houses and store buildings. The valley of McDame Creek is wide and important, running north-westward for about 7 miles and then turning nearly due west. At the angle thus formed a low wide pass leads through the mountains to the north-eastward where it connects with the valley of the Dease. The appearance of this pass, as seen from a distance, is such as to suggest that the Dease River itself may at some former period have flowed through it.

#### **McDame Mountains.**

The mountains bordering McDame Creek, viewed from Sylvester's Landing, are singularly different from any before met with. They are evidently composed for the most part of limestone, are characterized by the occurrence of long bare slopes of shattered rock fragments, and are scarcely at all wooded.

"Nine miles below Sylvester's Landing, the Dease makes its great bend towards the north, the intervening portion of the river somewhat changing its character from that above described, rock exposures being comparatively frequent in its bank and bed where they produce several small rapids.

"Four-Mile Creek enters from the south at somewhat less than the specified distance below Sylvester's. Sylvester's Trail to Turnagain or Black River (muddy river of miners) runs up this valley and follows a tributary (Sheep Creek) to the south-eastward. The distance to the trading post, or Turnagain River, is estimated at 90 miles, but it is probably less. Horses are employed in packing over the trail.

#### **Rapid River.**

The valley of the Rapid River joins that of the Dease, and its great bend just alluded to, but the stream running parallel with the Dease for some distance, enters it several miles lower down. Beyond this great bend the mountains near the river decrease rather notably in height and abruptness, and at the same time retreat from the vicinity of the river, the valley becoming very wide and long, hummocky slopes or groups of low hills coming in between the river and the mountains.

"The northerly course of the river here carries it very obliquely through the eastern portion of the Cassiar Range. The precipitation in this part of the valley is evidently inconsiderable. Sylvester successfully winters his horses here without cutting hay, or otherwise providing for them, the depth of snow in winter being so small that it does not seemingly interfere with grazing. Much of the valley, with the slopes of hill is open or partially wooded with groves of black pine and aspen.

"Below Rapid River the Dease changes its character considerably, becoming relatively wide, with numerous gravel-bars, and in some places many islands with frequent "drift-piles" or accumulation of timber. A few miles below reaching the second great bend, a stream joins from the west, which has become known to the miners as French Creek, and is probably the "Detour River" of old maps. It rises on the north-east slope of the Cassiar mountains, and is not large.

"The last main reach of the Dease is that which extends from the 2nd great bend to its mouth, a distance of 31 miles in a direction of N. 55° E., though the course of the river is far from being direct, the general bearing leaves the base of the Cassiar Range nearly at a right-angle. The country becomes low and uninteresting, and assumes a rather dreary aspect, being covered generally with forest of inferior growth, often degenerating into swamp or northern aspect, and with only occasional grassy openings on slopes with sunny exposures. In descending this part of the river, the mountains soon become invisible from the river valley, which is bordered by undulating lowlands or low hills, which rise to a plateau at some miles distant, 400 or 500 feet above the stream. The climate is more humid than before, and less favourable to vegetation. The current of the river is rather swift, and there are two or three considerable rapids, but none of importance till within four miles of the mouth, where there are several strong rapids, which, at certain stages of the water are reported to be dangerous. Terraces as much as 300 feet in height approach the river in some places in this part of its course, and when cut into generally show stratified gravels, which sometimes rest directly on low exposures of rock.

**Blue River.** "Blue River joins the Dease 12 miles below the second great bend. It is a stream 50 feet wide at the mouth, and derives its supply from the north-eastern slopes of the Cassiar Range to the north of French Creek.

**Lower Post.** "The Lower Post, which is the furthest outwork of civilization or trade in this direction, is situated at the edge of a terrace 40 feet in height on the left bank of the Liard, about half a mile above the mouth of the Dease. It is of a very unpretentious character, consisting of a few log cabins in the vicinity of which the woods have been entirely destroyed by fire.

"The Liard River is here said to be open as a rule from the 1st of May. In the Autumn of 1886, it was frozen over on November 21st.

**Agriculture.** "At Telegraph Creek, and in its vicinity on the Stickine to the east of the Coast range (lat. 58°), wheat, barley and potatoes are successfully grown with the aid of irrigation. Their cultivation has so far been attempted only on a limited scale on account of the want of any market, and wheat has been grown only experimentally, as it cannot, like barley, be employed for feeding pack-animals. None of these crops can be successfully grown or ripened on the coastward side of the mountains.

"Taking into consideration all the facts which I have been able to obtain, as well as those to be derived from an examination of the natural flora of the country and the observed advance of vegetation, which, in the absence of actual experiments are capable of affording valuable data, I feel no hesitation in stating my belief that such hardy crops as barley, rye, turnips and flax can be successfully cultivated in the Yukon District as far north as the former situation of Fort Selkirk, near the 63rd parallel or, in other words, 1,000 miles north of Victoria. Taken in conjunction with the physical features of the region this means that chiefly within the drainage area of the Yukon, for the most part north of the 60th parallel, there exists an area of about 60,000 square miles, of which a large portion may and, doubtless in the future, will be utilised for the cultivation of such crops for local purposes without undue labour, as excellent summer grazing is generally to be found along the river valley, and natural hay meadows are frequent. I do not maintain that the country is suitable for immediate occupation by a large, self-supporting agricultural community, but that agriculture may, before many years, be successfully prosecuted in conjunction with the natural development of the other resources of this great country, of which by far the most valuable portion lies to the east of the line of the Alaskan boundary.

## GEOLOGY.

"Speaking broadly, the rock series represented are evidently similar to those found in the southern portion of British Columbia, between the Rocky Mountains and the Coast, showing great constancy in lithological characters of the several formations, when followed in the direction of the main north-west and south-east axes of uplift—a constancy which contrasts markedly with the diversity found when comparisons are made as between localities situated at right angles to this direction.

**Coast Range.** "The Coast Ranges, where traversed by the valley of the Stickine and again where still further north by the Chilkoot Pass, are found to consist, for the most part, of granite and granitoid rocks almost invariably of grey colour and frequently rich in hornblende. With these are occasionally included stratified or stratiform masses of mica, hornblende, schists, and both these and the granites are frequently traversed by pegmatite veins, diabase dykes and intrusive masses of coarse diorite. The schistose portions of these ranges may possibly represent the still recognizable remnants of rocks of Archæan Age, or may be merely portions of much newer series which have suffered extreme alteration.

"No demonstration of the date of the origin of the granitic rocks of the Coast Range was obtained in this region, but there is every reason to believe that it is comparatively recent and due to a time lying between the Triassic and the Cretaceous, as has been found to be the case with their continuation to the south, near the northern part of Vancouver Island.

"The width of the belt of granitoid rocks comprising the Coast Range is, on the Stickine, about 65 miles, measured from their sea border inland at right angles to the main direction of the mountains. It is somewhat less in the latitude of the Chilkoot Pass, but may be assumed to occupy a border of the mainland about 50 miles in width along the whole of this part of the coast. Broadly viewed, however, the coast archipelago in reality represents a partly submerged margin of the Coast Ranges, and granitic rocks are largely represented in it also.

**Interior Region.** "East and north-east of the Coast Range, the interior region traversed is, for the most part, floored by Palæozoic rocks of very varied appearance, and probably referable to several of the main subdivisions of the geological scale. In so far as the information obtained in the region here in question enables conclusions on the subject to be formed, the lowest part of the rocks (1) consists of greenish grey schists, generally feldspathic or hornblendic, but often quartzose and, including distinctly, micaceous and talcose schists with some bands of limestone, the lithological character of this subdivision being exceedingly varied. Apparently overlying these are (2) grey and blackish, often lustrous, and sometimes more or less micaceous calc-schists and quartzites, including beds of limestone of moderate thickness, which are often more or less dolomitic. These are associated with, or pass into (3) black argillites or argillite schists, also containing thin beds of limestone, which on one locality on the Dease have afforded a small number of graptolites of Cambro-Silurian age. Next above these is a series (4) consisting chiefly of massive limestones, generally of grey or blue-grey colour when unaltered, but often locally changed into white or variegated crystalline marbles. On the Dease, on the Frances, and again on Tagish Lake fossils of carboniferous age, including more particularly a species of *Fusulina*, have been detected in some beds of this limestone series, probably belonging to its upper portion. This limestone appears to be conformably followed, or even in part interbedded with (5) a great mass of more or less evidently stratified rocks of volcanic origin, comprising amygdaloids, agglomerates and other more massive materials, which apparently represent old lava flows.

**Volcanic Materials.** "Analogy with the southern portions of British Columbia which I have examined leads me to believe that the greater part of these volcanic materials are also to be classed as of Carboniferous age, but it is quite probable that here, as to the south, they comprise as well rocks of similar appearance which are of Triassic age, but which we are at present unable to separate from them.

**Interior Granites.** "The preponderantly Palæozoic floor of the region east of the granites of the Coast Range is broken through on two main lines by granitic axes. The first of these is cut across by the Dease River, a short distance below Dease Lake, and was again met with over 300 miles north-westward on Pelly, near the mouth of the MacMillan. Though referred to as a single granitic axis this



uplift probably consists rather of a series of alternating and more or less irregularly shaped granitic masses, which however preserve a general alignment. There are on the upper Pelly in fact three separate granitic ridges in place of the single one met with on the Dease. In close association with these granites are some gneissic rocks and holocrystalline mica hornblende schists. A small tongue of granite occurs on the Lewes a few miles above the mouth of the Little Salmon, which may be connected with the south-western side of the granitic axis. Its further extension in a north-westerly bearing is proved by the occurrence of a great preponderance of rocks of the same character in the collection made by Mr. Ogilvie on the Lower Pelly or Yukon, between the mouth of Lewes and Forty-Mile Creek.

#### "CONNECTION OF GOLD WITH THE ROCK SERIES.

"On comparing the position of this irregular granitic axis, and its surrounding altered rocks with that of the richer deposits of placer gold so far discovered and worked, it will be found that they are closely associated. The chief placers and river bars are, in fact, scattered along this line or belt, and extend like it all the way from Dease Lake and McDame Creek to Forty-Mile Creek. Evidence was moreover found on the Pelly to show that the development of quartz veins in the Palæozoic rocks has occurred contemporaneously with the upheaval of the granites, and probably by some action superinduced by the granite masses themselves while still in a formative condition. While cutting the stratified rocks the quartz veins seldom or never cut the granite masses in this district. These observations should afford an important clue to the further search for auriferous ground, as well as for the lodes from which the placer gold has itself been derived.

**Too-Tsha Range.** "Of the second granitic axis of the interior region very little is yet known, but it is probable that it is still less regular in character than the last. It occurs in the mountainous region to the east of Frances Lake and river, and probably also in the vicinity of the Pelly Lakes. Its lithological characters are those of the last described, and here again in the vicinity of Frances Lake and on the Liard, paying gold placers have been found. The district is, however, so difficult of access that it can scarcely as yet be said to have been at all prospected.

**Basalts.** "In the Stickine valley, east of the Coast Range, important local basalt flows are met with, overlying old river and valley gravels, and the lignite reported to exist some miles up the Tahl-tan is doubtless also of Tertiary age and inferior in position to the basalts. Basalt effusions of the sporadic character may be frequent in other places in the region.

"The basalts are at least pre-glacial in age, and though no characteristic fossils were observed in the associated bedded deposits, both may be provisionally classed, from their analogy with similar deposits in the more southern portion of British Columbia, as Miocene.

**Geology of Stickine.** "The Great Glacier, rising many miles back in the higher ranges of the mountains in the material which it has brought down and deposited in its moraine, affords a mode of ascertaining the general composition of the central ranges. This material was found by Mr. McConnell to consist almost entirely of grey granite of medium grain, composed of feldspar, quartz, and hornblende in nearly equal proportions, but holding also a little mica and occasional crystals of sphene. Diorites and mica schists occur in smaller quantity, together with coarse pegmatite, which is evidently derived from veins intersecting the granite.

"Similar granitoid rocks, with occasional schistose areas, constitute the whole of the rock exposures seen along the river to the so-called Grand Rapids. The mountains bordering the valley also appear to be entirely, or almost entirely, composed of the same material.

**Below Grand Rapids.** "A short distance below Grand Rapids, distinctly stratified rocks of dark colour are seen capping some of the mountains, and resting upon the granites. These beds have a dip 30° to N. 70° E., which brings them down to the level of the river near the rapid. They are there found to consist of hard argillites and grauwacke-quartzites, interbedded with shaly, grey-brownish, impure limestones, the whole being considerably disturbed and cut near the granites by coarse, grey, porphyritic dykes of that rock. They are followed in ascending order by a massive, grey-blue, sub-crystalline limestone of considerable thickness, which can be traced in the mountains for some distance on both sides of the valley.

**Above Grand Rapids.** "About two miles and a half above Grand Rapids, near the mouth of the Clearwater, the limestone is followed by a series of altered volcanic rocks, which are, for the most part, of grey and greenish colours. These are, apparently, chiefly diabases, but include also porphyrite-like rocks. About six and a half miles below Glenora, exposures are found of slaty argillites and dark shaly rocks, containing some impure limestone, all very much broken and disturbed, and associated with altered volcanic materials.

**Above Glenora.** "From Glenora to Telegraph Creek, basaltic and other comparatively modern volcanic rocks become prominent features, the basalt appearing as remnants of horizontal flows, the broken edges of which form scarped cliffs. The basalts have evidently flowed along and partially filled the old river-valley, and unconformably overlies the old altered volcanic rocks previously alluded to, as well as all the other rock veins. About two miles below Glenora, the basaltic rocks were noticed in one place to have filled the old river bed conforming in their lower layers to the slopes of its sides, to have been subsequently cut across obliquely by the present river.

"Between Glenora and Telegraph Creek, the rock seen below the basalts include at least two distinct series. The first and oldest of these is represented by a number of occurrences of altered volcanic rocks, like those previously referred to, as well as by considerable exposures (beginning about a mile above Glenora) of grey-blackish, rather chert quartzites, often nearly on edge. The second consists of slightly indurated conglomerates, sandstones and shales. In the immediate vicinity of Telegraph Creek the prevalent rocks, a grey-green speckled altered volcanic material, which proves to be a fine-grained diabase tuff. The high hill immediately opposite Telegraph Creek, on the other side of the river, is composed of similar old volcanic rocks, comprising compact diabase and a massive diabase agglomerate.

**Cassiar Trail.** "Respecting the older rocks which characterize the greater part of the country between Telegraph Creek and Dease Lake may be described as consisting of grey and greenish quartzites and grauwackes, with a large proportion of altered volcanic materials, generally feldspathic, but passing into diabases and becoming in some cases more or less schistose. Rock originally of volcanic origin, notably preponderate in the vicinity of Telegraph Creek, while near Dease Lake they are less abundant and about two miles from the lake on the trail, massive grey fine-grained limestone occurs, in exposure and which are nearly continuous for about a mile. None of the mountains in sight on either side of the valley are distinctly granitic, and rocks of this character were observed only in one locality where they occupy a relatively small area.

"At about two miles along the trail, to the south-west of the Tahl-tan, a dark blackish-green, highly crystalline hornblende rock occurs in considerable mass, and is much broken and shattered by a grey porphyritic and hornblende granite which appears to be of late date, and which may have a width of about two miles on the trail. In the bed of the Tooya River rocks differing in appearance from any seen elsewhere on this trail were found. They are reddish and purplish in colour, fine-grained, and in some beds slightly porphyritic, and appear to be chiefly feldspathic in composition. One of these is identical with a rock met with in the lower part of the bedded series, a short distance above 'Grand Rapids.'

"The preglacial age of the basaltic rock is shown by their relation to the terraces of the valley, and also by the occurrence upon them of large granitic boulders, the transport of which must be attributed to glacial action. This is seen particularly in some places between Telegraph Creek and the Tahl-tan. The basaltic rocks at the period of their eruption have filled the old river-valley, and may very probably have at one time done so continuously from below Glenora to the Tooya, or perhaps considerably further. Subsequent to the period of basaltic eruption the river still flowing in the same great valley has cut down through the basalts in several places exposing sections of the gravel deposits of the ancient river. The new channel thus formed is not, however, co-incident with the old, but cuts across it at several points, and above Telegraph Creek the excavation of the new bed has been covered to a depth estimated at from 40 to 70 feet below the earlier one. A few miles below Glenora, where the basalt filling of the old valley has been cut across it seems, however, that the old river bed is below the present water level, indicating in connection with the previous observation that the grade of the original river was greater than that of the present.

#### "OLD CHANNELS AND GOLD PLACERS.

"The basaltic formation of this part of the Stickine has been described in some detail on account of the importance it possesses in respect to the distribution of gold. The gold along

the Stickine was said by the miners to be 'spotted' or irregular, in its occurrence, but the greater part of the heavy gold was found just along that portion of the stream now characterized by the basalts and it appears even possible to trace a connection between the richer bars which have been worked and those places in which the present river has cut through or followed the old basalt protected channel. This being the case it seems desirable that the old channel should be fully prospected which I cannot learn has ever been attempted. If gold should be found in it in paying quantity, it might easily be worked and would give rise to a considerable renewal of activity in mining. It is not known to what extent similar conditions may occur up the Tahl-tan Valley, where also remunerative bars were worked some years ago.

"It seems probable, from outcrops and float along the lake shore, that  
**Dease Lake.** the whole country is underlain by Palaeozoic strata, resembling those described to the south-eastward. In addition to the limestone already noted as occurring at the head of the lake, these are grey and greenish rocks, representing altered materials of volcanic origin, associated with leek green serpentine, in which some minute veins of chrysolite or asbestos were noted. Besides these, and probably predominant as a whole in the valley of the lake, are argillite schists, which vary from black plumbaginous to a grey finely micaceous character, and are often lustrous and not infrequently highly calcareous. The rock as a whole closely resembles those of parts of the gold-bearing series of Cariboo District.

"For about 12 miles below the lake the rocks comprising the mountain seem to be referable to the same Palaeozoic series which has been described as occurring on Dease Lake, but the exposures examined appeared to be somewhat more highly altered, and in some cases to approach the character of crystalline schists. One bedded rock is probably a diabase, with somewhat lustrous division planes and kernels of epidote.

#### "GRANITE ROCKS OF CASSIAR DISTRICT.

"Beyond the point above defined, at the first little lake, a granitic area is entered on, which may be regarded as constituting the axis of the Cassiar Range, and which extends on the river to the mouth of the Cottonwood.

"The valley of Cottonwood Creek appears to coincide with the north-eastern edge of the granites for a number of miles. The mountains to the south of it, and extending westward along the north side of the Dease, are evidently composed of stratified rocks, including important beds of limestone.

"The range to the east of McDame Creek is largely composed of limestone, which, striking in a north-west and south-east direction, constitutes also the mountains on the south side of the Dease. The limestones are associated with reddish shales, and near the mouth of the Rapid River were observed to be interbedded with dolomite layers and calcareous schists. The mountains bordering the north and south part of its course between the first and second great bends, appear to be composed throughout of similar rocks.

"Eleven miles south of the second great bend, on the right bank of the river, is a low rocky cliff about 15 feet above the water, capped by about 10 feet of bedded white silts. The rocks are blackish sandy shales rather hard in some places, carbonaceous and holding a little impure lignite. They are extremely irregular in dip, and are broken and jumbled up with a hard grey quartzite, which is seen in places as the underlying rock, but is even then singularly shattered."

#### (C).—REPORT BY MR. JAS. PORTER, GOLD COMMISSIONER, LAKETON.

"The total yield of gold for the district this season, as you will observe, is small, and certainly does not look very encouraging when received only in the light of the past few years. But even then, taking all into consideration, it is not such a bad showing after all, for the greater part of it has been mined by a few old Chinese miners, who seem to be quite satisfied to continue scratching year after year in the old workings met with along the different creeks. Now, beyond a doubt, this hitherto almost forgotten part of the Province is about to bloom into prosperity and mining activity, and it is my honest belief that, instead of the annual output of gold being what it is to-day, the returns of the near future will be enumerated by the hundreds of thousands of dollars.

"Altogether, quite a number of new faces were met with here during the season, and two-thirds of them were turned in various directions in quest of quartz. I am pleased to be able to say that some very good-looking rock has been discovered, and, as a result, some seventy-eight mineral claims have been recorded. A considerable quantity of ore from some of these ledges has been taken to the coast for assay, and I firmly believe that some of it will give good results, as gold could be seen plainly with the naked eye.

"Some attention has been given towards securing placer mining properties in the district. Three applications are on file for leases of half a mile each of creek on the third north fork of McDame Creek; applications have also been handed to me for four leases of hill ground situated on the south side of Thibert Creek for hydraulic mining on a large scale.

"A short time ago, I had the pleasure of meeting here Mr. Warburton Pike, promoter of the Cassiar Central Railway, and he informed me that it was the intention of the company to commence the construction of the road at the earliest possible date.

"Hitherto, means of communication have been such that considerable time and expense had to be consumed and incurred in reaching this place, and mining men have been attracted to other parts more easy of access; but with a good steamboat service established on the Stickine, a railroad leading across the portage to the head of Dease Lake, with interest aroused by the progress of mining development and the vast field for operations, Cassiar is on the eve of a bright future, and will soon be aroused from her long slumbers into bright activity."

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## OMINECA.

### (A)—"MINERAL WEALTH OF BRITISH COLUMBIA."

DR. G. M. DAWSON, 1888.

"Next in order, on the line of the auriferous axis of the Province, and separated from the last-mentioned region by a considerable interval in which no important gold mining has yet occurred, is the Cariboo District, previously described.

"Still further to the north-westward, along the same belt, beyond an interval in which the Gold Range can scarcely be traced, is the Omineca District, first entered about 1864, but scarcely developed till 1867. This district is situated near the 56th parallel of latitude and is in the drainage basin of Peace River. The area within which the greater part of the mining has taken place is scarcely more than 50 miles in greatest diameter, and includes the upper portions of Germansen, Omineca and Manson Rivers and their tributaries. This area is described as being hilly rather than mountainous, and is nearly everywhere covered by the dense northern forest. A very high opinion was at first formed by miners of the Omineca District, but when the Cassiar discoveries occurred it was nearly abandoned. In 1879 it was re-occupied by about 57 whites and 20 Chinamen, and Vital, Germansen, Manson, Black Jack (a tributary of the last) Slate and Lost Creeks were being worked, but the richer known localities having since been worked over, the mining has gradually dwindled to very small proportions. In 1887 only 12 whites and about 18 Indians are known to have been at work, and the gold produced is estimated at \$13,000. Much "coarse" gold was obtained, but the diggings were generally complained of as being "spotted" or irregular. This district is practically the most remote and inaccessible in the Province; the cost of supplies has always been excessive, and the difficulties in the way of enterprise in the form of exploration thus very great. A wide area of promising country in this region, therefore, remains untried. The headwaters of Finlay River have always been considered particularly promising from the fact that good 'prospects' of fine gold are found in all the river bars, some of which have paid well for work on them.

"The sources of the Nation River have also been favourably spoken of, and the Misinchinca and other tributaries of the Parsnip present all the appearance of gold-bearing streams, but so far as I know have never been tested. The 'fine' gold which is found and has been mined along the whole upper portion of the Peace River, has doubtless been carried through the

mountains by that stream, and is derived from the wide belt of dark, shaly and schistose rocks which runs along the western flanks of the Rocky Mountains in this portion of their length.

"Considerable quantities of arquerite, a silver amalgam, containing about eleven per cent. of mercury, have been found with the gold in scales and nuggets, in Omineca, particularly upon Vital and Silver Creeks. This metal is commonly referred to by the miners as 'silver,' with which its appearance is identical. Very promising deposits of highly argentiferous galena have been found in the vicinity of the placer mines in Omineca, but no attempt has so far been made to work them.

"The miners reached Omineca by two principal routes, viz.: with pack animals, by trail from Quesnelle *via* Stuart Lake, and on foot across the Babine and Fire Pan Mountains from the Forks of the Skeena, the Forks being attained in the first place by ascending the Skeena River from the coast in canoes.

"The gold yield for the first and more prolific years of the Omineca District cannot be ascertained with any completeness, and even since the commencement of the annual Government reports a gap of three years occurs, no returns being given for 1876, 1877 and 1878. During these years, however, the field was virtually almost deserted." The following table is based on the Government reports:—

1874 .....	\$38,000
1875 .....	32,040
1876 .....	no returns.
1877 .....	"
1878 .....	"
1879 .....	36,000
1880 .....	45,800
1881 .....	39,300
1882 .....	25,330
1883 .....	21,000
1884 .....	12,000
1885 .....	16,500
1886 .....	17,600
1887 .....	13,000
1888 .....	no returns.

#### (B)—EXTRACTS FROM REPORT BY R. G. McCONNELL, B.A.Sc.

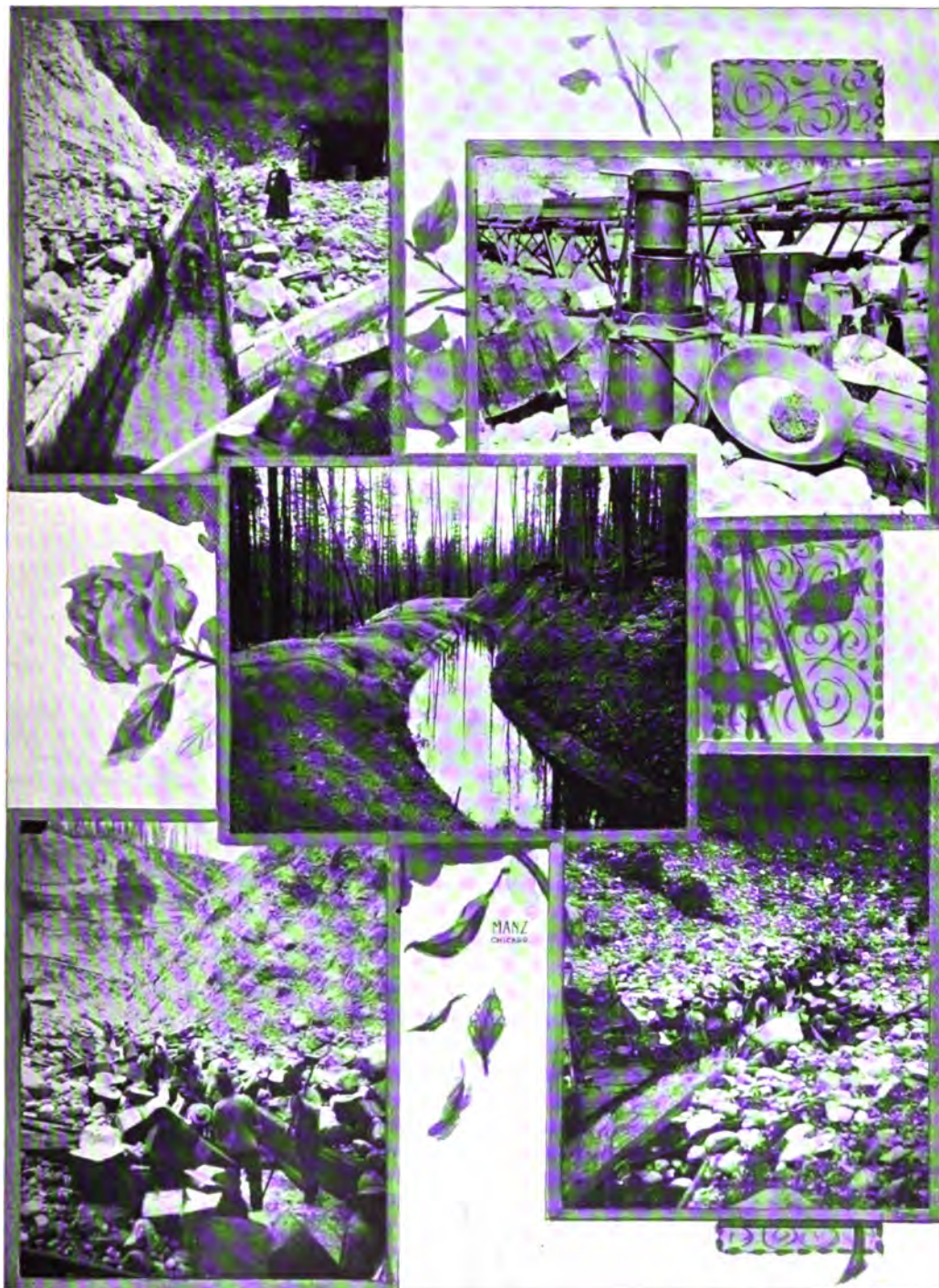
##### GEOLOGICAL SURVEY, 1896.

"The Omineca District, embracing the Omineca and Manson Rivers, with their tributaries lies near the 56th parallel, about longitude 125, at the head of the Peace River basin. The actual area from which gold has been taken is perhaps 2,500 square miles. Finlay River receives the Omineca near its mouth, and drains a considerable area to the north. The Omineca lies in Omineca Mining Division, and the Finlay, except a few miles at its mouth, in the Laketon Division.

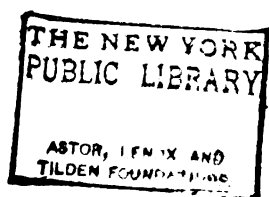
"The available routes to this section are two, one by way of Ashcroft and Quesnelle, the other by the coast waters and Skeena River. (a.) From Quesnelle passage may be made up the Fraser River to Giscome Portage, 27 miles above Fort George, 110 miles in all from Quesnelle. By Giscome Portage to Summit Lake, down Crooked River, McLeod Lake, Pack and Parsnip Rivers to the mouth of the Finlay, 150 miles. Owing to the difficulties of navigation in ascending the rapid Fraser and descending the shallow Crooked River, the overland route may be taken from Quesnelle to Stuart Lake by trail, and thence to Manson on Manson Creek, a distance of 250 miles from Quesnelle."

To reach the Omineca probably the best trail is now *via* Hazelton, on the Skeena River, across Babine Mountains and Babine and Tatlah Lakes (by ferries), thence to head of Vital Creek, whither a trail leads down to the Omineca River and on to Manson; while another, north of Germansen Lake, runs to Manson near which two companies are now at





VIEWS AT CARIBOO HYDRAULIC MINE, QUESNELLE FORKS, B. C., TAKEN DURING THE "CLEAN-UP" OF \$62,000, AUGUST, 1897.



work (1897). Old trail from Quesnelle, part of it being the Telegraph Trail, is also open, and much of the supplies for the hydraulic mine has been sent in this way. If the telegraph line is constructed to Dawson City, this old Telegraph Trail, in all probability, will be greatly improved.

"The most notable feature of the country, in the latitude of the **Topography.** Omineca and Finlay Rivers, or from 55° 30' N. to 57° N., or beyond, it is universal mountainous character. In this latitude the whole country from the eastern edge of the Rocky Mountains, westward, to the Pacific Ocean, is destitute of plains of any considerable extent, and with the exception of the narrow flats along parts of the principal rivers and lakes, Babine, Tacla, etc., is covered with a succession of mountain and mountain ranges, in height from 3,000 to 5,000 feet above the valleys. In no other part of British Columbia is the country so persistently mountainous across the whole Cordilleran belt. Timber is entirely absent above an altitude of 5,200 feet, or nearly 3,000 feet above Lake Tacla, but below this, dense forests of spruce, pine, fir, with some aspen, balsam and birch, cover the whole country.

"Finlay River, which is in reality the upper portion of the Peace, rises in an irregular mass of mountains north of Tacla Lake, where low passes connect the headwaters of its various branches with the feeders of the Stickine and Skeena Rivers. Flowing in a north-easterly direction at the start through a number of branches, it then turns east and south-eastward, receiving the Thudaca and the Tsetieca Rivers. This part of the river is very rapid and broken till it reaches Long Canyon, below which the current diminishes, and the river becomes navigable 10 or 12 miles below Long Canyon, the Finlay bending eastward breaks through a range of mountains 5,000 to 6,000 feet high, and enters a valley 3 to 6 miles wide, which it flows for a distance of 125 miles, increased a third by its windings to join the Parsnip River. At its entrance to the valley the Finlay receives the Tochieca River from the north and 3 miles below the Inadacha or White Water, well named from the colour caused by the presence of silt derived from the glacier in which this river is said to rise among the Rocky Mountains. For eleven miles the Finlay flows in a nearly straight direction to the mouth of Paul's Branch, a small stream from the north-east. For 35 miles the river now winds through the valley to the mouth of the Akie, bordered in some places by gravel and boulder clay banks up to 25 feet in height. Akie River enters the Finlay in two branches, the larger of which is 100 feet wide; its valley is wide and cuts straight back into the mountains to the north-east for about 12 miles, then bends to the north, but sends a branch to the southward.

"The Finlay now makes a couple of great bends to the east, exposing high cut banks of boulder clay, silt, and gravel, and then passes through Deserter's Canyon, the only serious interruption to navigation between Long Canyon and the mouth. This canyon is about half a mile long, and in the narrowest places scarcely exceeds 100 feet in width. It is cut through hard conglomerate and sandstone, but with low walls generally. The canyon can be run at certain stages of water, but is distinctly dangerous, and can be avoided by means of a portage track half a mile long, cut out by the Indians along the west bank.

"Five miles lower down, the Finlay becomes obstructed by numerous islands and bars, the river being frequently divided into half a dozen different channels. Fourteen miles below Deserter's Canyon, the Ingenica flows in from the south-west. This is a clear, rapid river, 50 to 60 yards wide, and is reported navigable up to the forks, a distance of 30 miles, above which it is filled with rapids. An Indian trail runs up the bank of the Ingenica and crosses the divide to Fort Connelly, on Bear Lake, at the head of the Skeena River, a distance of about 60 miles. Twenty miles below the Ingenica is Fort Grahame, from which another trail goes to Fort Connelly, following a small stream which enters the river opposite Fort Grahame. There is also said to be a trail from here to the Liard River. About 25 miles of unimpeded channel, 200 yards wide, cut through beds of sand, clay and gravel to a depth of 100 feet, in which the river flows at a rate of hardly two miles an hour. The Ospica here flows in from the north by two mouths, each about 100 feet wide. A mile lower down, the Omineca enters with about one-fifth the volume of the Finlay. From this point to its mouth, about 15 miles, the Finlay is again tortuous, and is much broken by gravel bars and islands, attaining an extreme width of 300 yards.

**Omineca River.** "The Omineca River joins the Finlay from the west, about 15 miles above the junction of the latter with the Parsnip, and is by far its largest tributary. From its mouth to the Black Canyon, a distance of five miles, its course is about 30° south of west. The stream is shallow in this reach,



and its current is extremely swift. Numerous gravel bars and islands, covered in places by huge drift piles, obstruct the course of the stream and divide it in places into several channels.

"At the Black Canyon, the Omineca cuts through a ridge of gneiss. The canyon is about half a mile in length, and varies in width from one to two hundred feet. Its walls are usually nearly vertical, and in places exceed 150 feet in height. In low water, the navigation of the canyon is reported to be easy, but in seasons of flood the swollen stream is partly dammed back, and its efforts to force a way through the narrow channel is attended with the production of such whirlpools and billows that its passage with large boats is exceedingly difficult, and with small boats impossible. A trail has been cut along the north bank, by which a portage can be made. The ridge through which the Omineca cuts at the canyon increases rapidly in height to the north, and develops into a mountain range, the peaks of which exceed 5,000 feet in height. Southwards the ridge soon dies away.

"Above the Black Canyon, the valley is closed in for a mile or more by steep cliffs and sandstone, clay, and conglomerates, between which the stream rushes with torrential speed. Farther up, the stream bends to the north-west, and follows parallel to the direction of the mountain ranges of the district, the rocky walls disappear, and the river, freed from confinement, enlarges to twice its former width. Above the bend, the river follows a wide valley between the mountains as far as the mouth of the Tchutetzeca, a distance of 10 miles. The river is here wide and swift, without rapids, but with short and strong riffles every few hundred yards, exceedingly difficult to ascend. Great piles of drift-wood are heaped at all the bends, and on the heads of the numerous bars and islands around which the stream divides. The Tchutetzeca, a rapid stream about 150 feet wide, comes in from the north-west down the same valley occupied by the Omineca above the canyon.

"Above the mouth of the Tchutetzeca, the Omineca leaves the longitudinal valley followed below, and bends to the west. The declivity and current increase, and for some miles the river is a wild torrent plunging in a succession of rapids from bar to bar, making the ascent a matter of extreme difficulty. \* \* \* Five miles above the Tchutetzeca, the Oslinca comes in from the north. This is the largest tributary of the Omineca, being nearly as large as the main stream. It drains a large area of mountainous country lying between the Omineca and the south branch of the Finlay, which is practically unknown.

"Above the mouth of the Oslinca, the Omineca cuts through a gneissic band, and, for some miles, lofty ranges of mountains press close down to the banks of the river. Six miles above the Oslinca, a contraction of the valley occurs, which is known as the Little Canyon. At this point, the river makes a sharp double bend, strikes with its whole force against two points of gneissic rock which jut out in succession from either bank. The canyon is comparatively easy to ascend, as the tracking line can be used all the way by crossing the stream below the two rocks, but is dangerous to run at high water.

"Above this the current of the river sensibly diminishes. Riffles are still numerous, but they occur at longer intervals, and, with a few exceptions, are of inconsiderable fall. Nine miles above the canyon, quiet water is reached, and paddles can be used for the first time. This is about 35 miles from the mouth of the river, and is 425 feet higher than at that point.

"From the head of the rapid water to Germansen Landing, at the mouth of Germansen Creek, a distance of 12 miles, with the exception of a few small riffles the current is easy, from two to three miles an hour.

"The river has a width of about 100 yards, and for part of the way becomes very tortuous, winding from side to side of the wide flats which now border it. Before reaching Germansen Creek the Omineca turns almost due west, and continues in that direction for many miles.

"Germansen Landing in the old days was a place of considerable importance, as most of the supplies for the Germansen and Manson Creek camps were brought from Tacla Lake across to the Omineca, floated down stream in boats and landed here for distribution. In recent years this route has been abandoned, and such supplies as are needed for the few remaining miners are brought in by pack train.

"An old trail, now in bad repair, runs from the Landing up Germansen Creek, which it crossed in about three miles by a bridge now probably destroyed. About six miles farther up the trail leaves the creek, crosses a bridge 1,300 feet high to the valley of Slate Creek, a branch of Manson on Manson Creek.

"Above the mouth of Germansen Creek the Omineca winds through a wide valley, bottomed in places by marshy flats, behind which appear ranges of high mountains. The

current is generally slow for about thirty miles to New Hogem, where it again becomes rapid, and so continues for eight miles to Old Hogem. From this point trail runs to Tacla Lake, by way of Silver Creek, which it follows about six miles past the mouth of the Vital Creek, and turning up Kerney crosses the divide and descends to Tacla Lake. From Tacla Lake to Tom's Creek, a distance of about twenty miles, a comparatively new trail has been built by the Provincial Government. From Tom's Creek to Vital, the trail is little used and is in poor condition.

"Above Old Hogem the Omineca trends to the north-west, the valley is generally narrow, and the river a succession of rapids. The upper waters have been but little explored.

**Tacla and Babine Lakes.** by the Fire Pan Mountains, lying in valleys parallel with the great valley which is occupied successively by the Finlay, the Parsnip and other rivers to the south, the direction being approximately that of the Rocky Mountains.

#### "GEOLOGY.

"The geological formations represented in this section show a considerable variety. The west slope of the Rocky Mountains consists largely of gneisses and schists, with some crystalline limestone, diorite and quartzites, the eastern ranges exhibiting bedded limestones. The area of Archaean rock gneisses, schists and crystalline limestone occupies the western side of the Finlay also as far up as the Ingenica, where it bends a little more to the west, and the river flows through shales, and sandstones and conglomerates which occupy the valley, but are not found on the higher levels. The same formation appears to be present in the Tacla Lake valley, and also along the Omineca for a few miles above Black Canyon."

The mountains pierced by the Finlay, where it enters the main valley above the Tochieca, are composed of green volcanic schists, in which some stringers of quartz alternating with bands of yellowish weathering dolomite, are reported by Mr. McConnell. Similar green schists, associated with dry grey argillites and some diabasic tuff, occur along Germansen Creek, and the Omineca from Germansen Landing to New Hogem, and again in the range between Tacla Lake and the Omineca. A small area of conglomerates and sandstones forms the Finlay valley to the west of the schistose range, and is followed by a belt of limestones, with schists and argillites about five miles wide, which apparently extends southward to a distance of sixty miles. A narrow strip of conglomerate, interbedded with some quartzites and schists, and succeeded by the Archaean schists, which confined the valley at its mouth. These are here about six to ten miles wide, and give way to eruptive rocks, consisting of diorite on the border, but passing into granite. Two limestone areas occur on Omineca River, the first part above the Tchutetzeca and the other below Germansen Creek, separated by an area of Archaean schists overlain on the west side by fine-grained conglomerate, quartzites and slates.

"Granite is found on Manson Creek and on Omineca River between the two areas of volcanic schists before referred to, and following the river upwards from above New Hogem to the Omineca, Sitelka Pass and beyond as far as explored, a distance of twenty-five miles or more.

**Gold Deposits.** "Gold was first found in this neighbourhood in 1861 on the Parsnip, about twenty miles from the mouth, and was successively found on Toy's Bar, on Finlay River, below the Omineca, on Silver Creek, Vital Creek, Germansen, Slate, Manson and Lost Creeks, and on Tom's Creek in 1889.

"The gold in the Omineca region has been obtained principally from the gravels overlying the older rocks in the beds of the present streams. The gravels as a rule have little depth, and the productive portions of the different streams seldom exceed three miles in length. The auriferous gravels underlying the boulder clay on Germansen, Manson and other creeks in the district have a wide distribution and promise favourable results if worked on a sufficiently large scale. Water can be obtained almost anywhere from lakes and mountain streams within a reasonable distance, and the only drawback to successful hydraulic mining is the great expense attendant on the carriage of material and supplies from the coast. At the present time the greater part of the supplies are brought in by pack animals from Hazelton, at the Forks of the Skeena, the rate to Manson Creek amounting to seventeen cents per pound.

"Some prospecting has been done in the Omineca region every season since its auriferous character became known, but the district has by no means been thoroughly explored. The discovery of pay gravels on Tom's Creek, close to Vital Creek, twenty years after the latter

was found, shows how loose the examination has been. That further discoveries of auriferous creeks will be made admits of little doubt. (Geol. Survey Report, C., 1893.)

"The same remarks apply with perhaps greater force to the Finlay system. Fine gold has been found in small quantities all along the river and at the mouths of its chief branches, the Ingenica, Quadacha and Tocheica; but on Paul's branch, or the neighbouring streams from the Rockies, none of these creeks have been thoroughly prospected, nor has the main river, while a large tract of quite unexplored land lies to the north between the Finlay and the Liard. The bars now known are nearly all virtually worked out, the out-put being estimated at \$1,000,000.

#### Silver.

"Arquerite or silver amalgam has been found to a considerable extent in the placers of Silver and Vital Creeks. Argentiferous galena has been found in strong ledges on Boulder and Lost Creeks.

#### Present Status.

"Mining in a small way has continued ever since the outset of mining, a few miners remaining in the country after the first excitement subsided, and small quantities of gold have been taken out annually. Recently, however, a good deal of attention has been paid to the district as a prospective large producer by hydraulic methods, and several large companies have been organized, and have secured a number of claims. The Omineca Consolidated Hydraulic Mining Company, Limited, Victoria, is one of these, having a capital of \$1,000,000, and commenced operations in 1886 on Manson and Slate Creeks. This company was formed for the purpose of purchasing and operating nine placer claims of 80 acres each, situated on Manson, Black Jack Gulch and Lost Creeks, from which in the early seventies large pay was taken.

"The Caledonia General Mining Association, Victoria, with a capital of \$1,500,000, has purchased 640 acres of placer ground on Germansen Creek, and is taking in supplies and machinery.

"An Ottawa Company, the 43rd Mining and Milling Company, has acquired seven claims on Manson and Slate Creeks, and is erecting a saw-mill, and taking in machinery." (Year Book of British Columbia, R. E. Gosnell).

### PEACE RIVER.

Peace River is the continuation of Finlay River after its junction with the Parsnip. It flows eastward, close to the 56th parallel of latitude, from the 124th meridian into the North-West Territories, finding its way through Slave and Mackenzie Rivers to the Arctic Ocean.

#### Routes.

Access to the Peace River may be gained from the east by way of Edmonton and Dunvegan, N. W. T., or from the west *via* Quesnelle.

(a.) From Edmonton a waggon road runs north about 80 miles to Athabasca Landing, from which point the Hudson Bay boats go up the Athabasca 50 miles to Little Slave River, and up this to Little Slave Lake. The river is about 40 miles long, very crooked and, in the lower half, shallow and rapid. To the Hudson Bay post near the head of the lake is 65 or 70 miles, the width of the lake being from 2 to 14 miles. This post may also be reached overland from Edmonton by a trail 210 miles in length, and connects with Smoky River Post at the junction of Smoky River with the Peace, by a trail of 65 miles. The ascent of the river may be made by boat or by horse, the distances as given by Dr. Selwyn being as follows:—

Smoky River to Dunvegan.....	44 miles.
Dunvegan to Fort St. John ..	70 "
Fort St. John to Hudson's Hope.....	38 "
Hudson's Hope to head of Canyon by portage Mt. of Rocks ...	11½ "
Head of Canyon to mouth of Parsnip.....	75 "

(b.) The journey from Quesnelle may be made entirely by water, ascending the Fraser River 110 miles to Giscome Portage, 27 miles above Fort George. A portage of 6 or 7 miles is here necessary to Summit Lake, whence a series of little lakes connected by streams, sometimes rapid, sometimes still, leads to McLeod Lake. Of this portion of the route known as Crooked River Dr. Selwyn writes in his Report, 1876: "In some places the channel was 20 or 30 yards wide, full of large, rounded stones and barely sufficient depth of water to float the boats over them; in others it is still shallower and, for long distances, we had either to walk

alongside in the water lifting the boats over the stones or to make a channel by moving the stones or digging out the gravel."

McLeod Lake, 17 miles long with an average width of 2 miles, discharges at Fort McLeod into Pack River, which empties into the Parsnip, 17 miles below.

The arduous ascent of the Fraser River and the difficulties of Gismombe Portage and of Crooked River may be evaded by taking the overland route to Fort McLeod. This route follows the old Telegraph trail from Quesnelle as far as Tsinkut Lake where it branches and runs to Fort St. James on Stuart Lake, 144 miles from Quesnelle; from here to Fort McLeod is about 70 miles. Of this route Dr. Selwyn (Geological Survey Report, 1876), says: "Between Quesnelle and Fort McLeod Lake the trail crosses twelve considerable streams and one narrow arm of a lake, besides a number of brooks from 5 to 20 feet wide; these occur in the following order:—

1. West River flows to right; valley 100 feet deep; descent over sand and gravel terraces 25 feet wide; rapid current.
2. River discharging Pantage Lake runs through wide, swampy flats; joins Westroad River below the lower canyon; 20 to 30 feet wide.
3. Westroad or Blackwater River, 120 feet wide at the ford; wide valley, 360 to 400 feet deep; a good bridge 2 miles below the ford.
4. Chilacco River about 40 yards wide; swift current; fine, grassy flats.
5. Tsinkut Lake River; fine, grassy flats; 30 to 35 yards wide; good bridge.
6. Strong Creek, 25 to 50 feet wide; deep at both banks; wide flats with rich soil and luxuriant grass between this and
7. Nechasco River, south branch, 150 yards wide; strong current of deep water; no bridge or ferry.
8. Nechasco, north branch or Stuart's River, 200 yards wide; ferry; flats along river thickly timbered.
9. 9-Mile Creek, 25 to 30 feet; bridge.
10. Salmon River, west branch, 50 to 60 feet wide; valley narrow, about 150 feet deep; bridge broken, horses have to swim.
11. Swamp Creek, or east branch of Salmon, 30 to 40 feet wide; flats flooded by beaver dams; feed in patches poor and thin. The country between the branches is all sandy and gravelly, in ridges with boggy creeks and small lakes or swampy lagoons.
12. Crossing of Carp Lake, 90 yards wide; horses swim for about 20 yards; the bottom on both sides is fine gravel.
13. Long Lake River, upper crossing 50 to 60 yards wide and rapid current, about four feet deep.
14. Long Lake River, lower crossing at outlet on McLeod's Lake. Between Stuart Lake and Fort McLeod, much of the forest had been burnt; the trail was constantly obstructed by large fallen trees."

At the head of Peace River, the country is rugged and mountainous, **Topography.** the general level diminishing with the ascent of Parsnip River. Descending the Peace River, the main range of the Rocky Mountains is pierced, and the mountainous character continues as far as Hudson's Hope. Below this the country consists of more or less undulating plateau 600 or 700 feet above the river, open prairie-like to the north, but heavily wooded on the south side of the river. The climate is exceptionally mild for so high an altitude, and combined with the great fertility of the soil, promises for the Peace River country a great future as a crop producer. Prof. Macoun says of the plateau north of Fort St. John:—"For nine miles, the distance travelled, the whole country was covered with the most luxuriant vegetation, clumps of willows and poplars of various ages were interspersed with the most astonishing growth of herbaceous plants I ever witnessed. A thick mass of vegetation that averaged from 3 to 5 feet in height. It would be folly to attempt to depict the appearance of the country, as it was so much beyond what I ever saw before, that I dare hardly make use of truthful words to portray it. Rainy River, and the Little Slave Lake marshes are the only regions known to me that are in any way comparable to it. The latter, however, is swamp, while this is a plateau, nearly level, and in parts over 700 feet above the river." Prof. Macoun, quoting from the Hudson's Bay Co.'s journal at Fort. St. John, gives the dates of ice breaking on the river from 1866 to 1875, to vary from April 16th to 23rd, and the first ice drifting in the fall from October 31st to November 10th. (Geol. Survey Report, 1876).

The following brief notes on the geology of the district, are culled from **Geology.** Dr. Selwyn's report of 1876 :—The country generally is overlaid by a thick deposit of drift, or by clay, sand, and gravel beds of Tertiary age, with indications of lignite, underlying large areas in Blackwater valley, and along the Parsnip. Outcrops of fine grained quartzites, shales and slates, occur along the trail from Blackwater to Long Lake River, with some occurrences of diorite apparent. A band of limestone extending north-west and south-east from Fort St. James on Stuart Lake. Descending Pack River and Parsnip River, outcrops are sandy limestones, and limestone schists, shales and conglomerate and black carbonaceous slate, occur opposite Finlay River.

Entering the main range of the Rockies, Mt. Selwyn consists, so far as examined, of a massive reddish quartzite, overlain by grey calc-schists and limestones with clay-slate, which apparently form the main peaks of the range. Beds of sandstone occur at intervals with conglomerate, thin bands of slaty shale and bitumenous coal. Below Hudson Hope are dark argillaceous shales, carrying fossils and associated with sandy calcareous layers, also fossiliferous. Beds of brown sandstone appear in the hill of the river, from which excellent grindstones have been made. Up Pine River the same rock occurs, and in the shale about 50 miles up the river near Table Mountain, Dr. Selwyn reports 4 small seams of bitumenous coal of good quality.

**Gold Deposits.** Fine gold has been found in numerous places on the Parsnip and Peace Rivers, frequently in paying quantities. The tributaries cannot be said to have been properly prospected, and little or no work is being done in this section now.

### THE LIARD RIVER.

The following account of the Liard River in British Columbia; is taken from Mr. McConnell's Report for the Geological Survey, 1889 :—

"Rising in the elevated country west of the Rocky Mountains, the Liard falls rapidly towards the east, and is characterized nearly everywhere by impetuous currents, by dangerous rapids and narrow whirlpool-filled canyons. The descent of the river is greatest, and its rapids most numerous while passing through and for some distance on either side of the Rocky Mountains.

"The Liard River was used for a number of years by the Hudson's Bay Co. as a trading route to the Yukon, and a line of posts extending from Fort Simpson, on the Mackenzie, to Fort Selkirk, at the junction of the Lewes and Pelly was established by them, but most of the posts have long been abandoned. The Liard has also been used, to some extent, by prospectors and miners, the discoverers of the Cassiar gold-fields, Messrs. McCollough and Thibert, having ascended it from Fort Simpson to the mouth of the Dease, 1871-72.

"The Liard River, below the mouth of the Dease, has a general width of from 250 to 400 yards, widens out in places to over half a mile, and a current of four miles and a half an hour. It separates in places into a number of channels enclosing low alluvial islands usually well wooded. Its valley is from two to three miles wide, and is shallow with rolling banks, sloping easily up the general level. The country is everywhere well wooded, but the trees are usually small, seldom exceeding a foot in diameter. Twelve miles below the mouth of the Dease, the Liard receives a large tributary from the north. This stream is over a hundred yards wide and is called the Highland River, on the older maps it is named the McPherson River. In the direction from which it comes are some low hills at a distance of four to five miles, behind which appear snowy mountains. From the mouth of Dease River the Liard runs in a general south-east direction for 18 miles and then making a sharp bend to the north, runs for about the same distance in a direction nearly at right angles to its former course. Below the bend the river for 12 miles is wide and filled with islands, after which it gradually decreases in width, and this with the steeper slopes of the valley and the increasing strength of the current, which occasionally breaking into riffles, now hurries along at the rate of seven miles an hour, all afford signs of the approach to the Little Canyon.

**Little Canyon.** "The Little Canyon is about half a mile long, and in its narrowest places is about 200 feet wide. It is easily navigable in low water, but is dangerous for small boats during flood, as the channel is very crooked, and the

current, striking with great violence against the right hand bank is thrown nearly lengthwise with the direction of the channel making waves large enough to swamp any ordinary river boat which is drawn among them. This canyon can be run with safety by entering it nearly in the middle of the stream, which is as close to the left bank, as the lines of reefs and isolated rocks running out from that will allow, and once past these, making all haste to the left so as to clear the breakers below. In high water the rapid can be avoided by making a portage of about half a mile along the right bank.

"Below the Little Canyon the river widens to over half a mile, and the steep rocky banks are replaced by easier slopes of gravel and sand. These continue for three miles, after which, shales and sandstones reappear in the bank, and their confining influence is immediately seen on the rapid contraction of the stream and the formation of the second narrows. These sudden dilatations and contractions constitute one of the most characteristic features of the Liard, and are an indication of the heterogeneity of the formations through which it cuts. Through the defile just mentioned the stream rushes with great velocity, but with an even current, until near its foot, where it is forced between two points of rock scarcely 100 feet apart, which project into the stream from either bank and determine the formation of two rapidly gyrating and dangerous looking whirlpools. These can be avoided, if necessary, by making a portage of a few feet across one of the points. In ordinary stages of the water, however, they can be run without difficulty.

"At this point the shales, sandstones and conglomerates which have been exposed at intervals, all the way from the mouth of the Dease, are replaced by shaly limestone and soon afterwards by more massive varieties of the same rock.

"Beyond the narrows, the river at once resumes its ordinary dimensions, and rushing rapidly round a short bend enters one of the most picturesque portions of the valley of the Liard. The river averages about 300 yards in width, with a strong even current of about five miles an hour. The valley is everywhere densely wooded with evergreens, aspens, birch and alder, the changing greens of which are agreeably relieved at intervals by grey limestone cliffs, which rise steeply from the water edge.

**Porcupine Bar.** "Eight miles below the entrance to this portion of the river is situated Porcupine Bar, once the scene of active mining operations, but now worked out and abandoned. Opposite it is a range of low hills, which extend in an irregular manner for some miles along the left bank of the river; they are composed of limestone, and have an altitude of 1,500 feet above the river or 1,000 feet above the general plateau level. The plateau stretches in all directions, everywhere densely wooded, the principal trees being the white spruce, the black pine, the birch, the rough and smooth barked poplars, the larch, and species of willow and alder; of these the spruce, which attain here a diameter of 15 to 20 inches, is by far the most abundant and valuable.

"From Porcupine Bar the river runs south-east for some miles and then, bending more to the south, preserves a general southerly direction for ten or twelve miles, when it is closed in by a nameless canyon. This canyon is scarcely a hundred yards in length, and is bounded by precipitous limestone cliffs about 150 feet apart. It presents no obstacle to navigation. Immediately below the canyon the river dilates for some distance into a large island-filled basin, beyond which it contracts again to its ordinary width of 300 or 400 yards, and runs with a swift even current in an easterly direction for five miles, when its course is interrupted by the Cranberry Rapids. Two miles above Cranberry rapids the limestones are replaced by shales, sandstones and conglomerates, and a change is immediately noticeable in the character of the stream. The declivity is greatly increased, and for the next 50 miles rapids are of frequent occurrence. The rough water at Cranberry portage has a total length of a mile and a half, but there is a reach of comparatively undisturbed water about half-way down. The upper part of the rapid is exceeding wild, as the bed of the river is filled with huge angular masses of rocks, against which the current breaks with frightful violence. No part of the channel is clear, and portaging is necessary.

"Below the rapids the river hurries on with a smoother surface but with scarcely diminished velocity. It is bordered for some distance by large eddies, between which and the downward current are long lines of dangerous looking whirlpools. Farther down is a long but easily navigable riffle, beyond which, with the exception of an occasional rock, the channel remains comparatively clear until the stream, variously known as Black, Mud, or Turnagain River, is reached.

**Turnagain River.** "This stream, although one of the principal affluents of the Liard, is at present almost unknown. It originates near the Finlay Branch of the Peace River, and joins the Liard after a course of about 256 miles. At its mouth it is over 120 yards wide. Eighty miles above its mouth is situated a small trading post, built some years ago by Mr. Rufus Sylvester, but now in possession of the Hudson's Bay Company.

#### " MOUNTAIN PORTAGE RAPIDS.

"From Mud River the Liard turns more to the north and, still running with great rapidity and breaking into occasional riffles, reaches in a couple of miles the Mountain Portage Rapids, one of the worst rapids on the river. The rapids in the main channel are separated from the left bank by an island, behind which, Mr. McConnell was told, after making a difficult portage, of a small channel which can be run with comparative safety.

**Rabbit River.** "Half a mile below Mountain Portage, Rabbit River comes in from the south. This stream is about 200 feet wide, and brings in a large volume of clear water. At its mouth is a large auriferous bar, which has evidently been worked by placer miners to a considerable extent. Below Rabbit River the channel is clear for a couple of miles, and in the next mile the river alternately narrows in and expands three times and falls over short but strong riffles at each contraction, all of which can be easily avoided, if necessary, by making portages a few yards in length. At the lower narrows three ugly looking whirlpools occur near the left side, and can be passed in safety by keeping to the right bank.

"From Whirlpool Canyon the river flows swiftly around a sharp bend, at the extremity of which it receives Coal River, and after a clear course of less than four miles, plunges over the rapids at Portage Brulé.

**Coal River.** "Coal River is a small stream about 100 feet wide, and is interesting on account of the quantity of lignite which it brings down. The lignite is of inferior quality; it is soft, and shows a well-marked woody structure. A walk of several miles up the river failed to reveal its presence *in situ*.

**Portage Brulé.** "Portage Brulé is nearly two miles long, and leads across a nearly level wooded flat, which at the upper end of the portage is only elevated a few feet above the surface of the river, but at the lower end is terminated by a sharp descent of over 200 feet. A good track was cut across this portage when mining was being prosecuted on the Liard, and a windlass built at the east end for the purpose of hoisting boats up the steep bank, both of which are still in good condition.

"The rapids at Portage Brulé are about two miles long and are caused by numerous limestone blocks and small islands obstructing the channel. At the lower end the river is narrowly confined by high vertical cliffs.

#### " RIVER AND COUNTRY BELOW PORTAGE BRULÉ.

"Below Portage Brulé no further obstacles to navigation were encountered until the Devil's Portage was reached. The river is wide and filled with low islands, bars, some of which are auriferous. McCullough's Bar, on which gold in paying quantities was first discovered on the Liard, occurs in this vicinity. The river valley is now lined with rows of terraces rising up to a height of several hundred feet, and clothed in unwooded portions by as luxuriant a growth of grasses and vitches as I have ever seen in any part of the country. Behind the terraces is a gently undulating region occasionally swelling into elevations of from 1,500 feet in height, and everywhere deeply forested, chiefly with white spruce. To the eastward the elevations increase in height and frequency until they merge into the range of the Rocky Mountains.

#### " AGRICULTURAL PROSPECTS.

"This part of the country, judging from the luxuriance of the vegetation and the character of the soil, seems well adapted for agricultural purposes, but the complete absence of climatic statistics renders any positive statements in this connection premature.

**Smith River.** "Ten miles below Portage Brulé, Smith River comes in from the north. This is a small stream about 100 feet wide, and appears to originate in a north-westerly spur from the Rocky Mountains, visible in the distance. At its mouth was situated Fort Halkett, a Hudson's Bay trading post, which has been abandoned

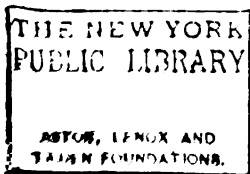


HALL MINES' SMELTER, NELSON, B. C.



BARKERVILLE, CARIBOO, B. C.





since 1865. From Fort Halkett the mountains appear quite close, and the river runs swiftly in a south-east direction straight towards a narrow gap which now appears in their ranks. Before entering this we pass, on the right hand side, the mouth of Rivere des Vents. This river comes from a large lake a few miles south of Fort Halkett, from which the fish supply of the Fort was obtained. It cuts off from the main range a steep-sided massive-looking mountain which I named Mount Ried. . . . The mountains here are narrowed to a single range, and even this, a few miles north of the river, is so reduced in height that it can scarcely be distinguished from the ordinary ridges of the district. To the south the range is much wider and the river seems to skirt the northern extremity of what may be considered the main division of the Rocky Mountain system.

"East of this passage of the Rockies, the mountains gradually recede from the river towards the south, and are replaced by high, rounded, and well-wooded hills and ridges built of dark shales, numerous exposures of which occur all along the banks of the river.

"The river has here an average width of 400 yards, and a steady current of about  $4\frac{1}{2}$  miles an hour. It is bordered in places by long gravel and sand benches, and encloses occasional wooded islands. Ten miles east of the gap, Trout River joins the Liard from the south. This is a swift, clear mountain stream about 150 feet wide, which seems to cut back into and drain the central ranges. Below Trout River, the Liard bends abruptly to the north for some distance, and then, turning to the east, continues on with an ever-increasing current between banks which gradually become steeper and higher until they develop into a wide canyon. At the last break in the almost vertical cliffs, and just at the head of a long, easy riffle, traces of the old portage track were found. The river at this point makes a great bend to the north-east, all around which is a succession of rapids and canyons. At the elbow of the bend, a large fall is reported. At the lower end of the bend, the river is reduced to a mere thread, as it is scarcely 150 feet wide, and as fully a third of this is occupied by shore eddies, its bed must be eroded to an enormous depth. Immediately below the contracted part is a large eddy, and the river expands at once to over half a mile in width.

"The Devil's portage is about four miles in length, and passes over a ridge 1,000 feet high, with very steep slopes on both sides, making it an exceptionally difficult portage. Grizzly bears are said to be plentiful in this vicinity, and moose and beaver abound as far as Hell Gate.

"Below the Devil's Portage for 30 or 40 miles, the river flows through what is called the Grand Canyon, but is more correctly a succession of short canyons with expanded basins between, filled with eddying currents. In low water, the whole of this reach can be easily run in almost any kind of boat, but in the season of high floods, the water forcing its way through the throat-like contractions, is thrown into commotion too violent for any but the staunchest boats to stand. Mr. McConnell was at this time using a canvas boat, and was obliged to make a number of short portages, and one over three miles in length. This last was below the Rapids of the Drowned, a very dangerous spot 20 or 30 miles below the Devil's Portage, where the river plunges with its whole force over a ledge of rock, which curves outwards and downwards from the left hand bank, into a boiling chaudiere behind. The danger is slight in a good boat by running close to the right bank. Below this comes a large riffle, after which the river is closed in by a hard sandstone bank, through a narrow gap in which it forces with difficulty a stormy passage. In the next four miles the river is closely canyoned in, five times, and falls over a number of riffles. Three miles of the rapid current follows to Hell Gate, so named because it is the entrance from below to this wild portion of the river. At this point there is an abandoned channel on the left hand side, which is navigable in high water, and affords an easy passage through.

"Escaping from Hell Gate Canyon, the river dilates as usual and is bordered by large eddies. Below these it runs swiftly around a large island, and then enters a canyon-like reach about a mile long. The stream here is narrowed down to about 150 yards in width, and flows easily between vertical banks 300 feet high. From this point on, the river has an uninterrupted flow, and presents no obstacles to navigation until near its mouth. Five miles below, the ridgy and hilly foot-hill district is replaced by a region of high irregular plateaus.

"The foot-hills along the Liard have a width of 38 miles, and are characterized by a much greater irregularity in altitude than is usually the case. South of the Devil's Portage, Mount Prudence, a steep-sided reddish looking mountain, rises abruptly from a surrounding of rough topped hills to an estimated height of over 4,000 feet. Going east from Mount Prudence, lower elevations prevail until near the Rapids of the Drowned, where the ridges

again commence to increase in elevation, and in a few miles culminate in peaks over 4,000 feet high. Still going east, they gradually diminish in importance, and at last die away and are replaced by flat-topped plateaus. This region, with the exception of the higher peaks, is everywhere densely forested, chiefly with the white spruce, the banksian pine and the aspen.

"After leaving the foot-hill country, the river runs in a general direction of N. 30° E., for 30 miles. In the wider portions the river is usually divided into several channels by islands and bars. The valley is narrow and trough-like, with steep sides rising up in places to a height of fully 1,000 feet. The bottoms are usually small and are here chiefly wooded by members of the poplar family. Some important tributaries are received by the Liard in this portion of its course, among which is Crow River which joins it from the north after entering the plateau country and Toad River which comes in from the south four miles farther down. Two miles below Toad River are the buildings of a deserted Hudson Bay post.

"At the end of this northerly reach, the river, here over a mile wide and filled with islands, bends suddenly at right angles to its former course, and after passing through a narrow gap, enters a much lower country. The steep scarped banks of the plateau district disappear, and are replaced by gently inclined hill-sides covered with forest, while the river spreads out and flows for some miles in a multitude of channels through a bewildering maze of islands. The eastern edge of the plateau district faces eastward with a steep slope, and has a height of over 1,000 feet. It runs nearly due north and south and forms an important feature in the general topography of the country.

Beaver River. "East of this escarpment Beaver River joins the Liard from the north. This is reported to be a fair sized stream, and to be navigable for canoes for a long distance. It empties into the Liard behind a group of islands, and we passed without seeing it. Near its mouth we saw the first Indians

since leaving the mouth of the Dease.

"East of the Beaver the Liard runs in a south-easterly direction for a few miles, and makes a couple of sharp bends before joining the Nelson. Nothing has been published concerning the Nelson, but it is reported to be a somewhat sluggish river about 150 or 200 yards in width. A hundred miles above its mouth is situated Fort Nelson, a Hudson Bay trading post. Above the post the river divides into two branches, one of which, named Buffalo River, turns west to the mountains, while the other continues on and interlocks with tributaries of Hay River.

"In 1872-73 a party of miners crossed from Peace River into the Liard by way of the Nelson on a prospecting trip. They descended Peace River to Half-way River, half-way between Rocky Mountain Portage and Fort St. John, and ascended the latter partly in canoes and partly on the ice for 100 miles. They then made a portage of 25 miles and reached the Nelson, down which they sledged for 60 miles, and then built boats and came the rest of the way by water. They only mention one portage of half a mile, but describe the river as flowing for a long distance above Fort Nelson between lofty banks of sandstone and shale. Colours of gold were obtained on the Liard at the mouth of the Nelson.

"At Fort Nelson some farming is annually done, and potatoes and other vegetables are grown without difficulty. The surrounding country is everywhere well forested, and is reported to produce a better grade of timber than any other part of the Mackenzie District.

"Below the Nelson the Liard has a general northerly direction for 30 miles, and then, bending more to the east, follows a north-east course as far as Fort Liard, 15 miles further down. In this reach it is generally wide and filled with sandbars and wooded islands.

"It is bordered in many places with wide alluvial flats, covered with tall, straight cottonwood and large spruce and canoe birch. Its valley is wide and shallow and lined with gently sloping spruce-clad banks. The greater part of this section seems well adapted for farming purposes.

"The two principal tributaries between the Nelson and Fort Liard are Riviere la Biche and Black River. The former enters from the north-west 20 miles below the Nelson, and the latter from the south-east at Fort Liard. Black River is the outlet of Lake Bis-tcho, and is reported navigable with difficulty throughout its entire course at high water. It will afford, with the Nelson and Hay Rivers, a ready means of entering and exploring the vast block of unknown country lying between the Liard and Peace Rivers, the Mackenzie and the Rocky Mountains."

## GEOLOGY.

Below the mouth of the Dease Mr. McConnell reports a few exposures of 'soft dark shales associated with friable sandstones and conglomerates,' and at the mouth of the Highland River some 'hard whitish sandstone, passing into quartzite.' The rocks in the Little Canyon consist of dark and sometimes cleared shales, holding large flattened ironstone nodules, hard sandstones and quartzites, and some beds of fine-grained hard silicious conglomerate. They are closely folded together and strike N. 35° W. A few miles below Little Canyon the shales and sandstones give place to limestones, which continue somewhat varied in character to near Cranberry Portage, where shales, sandstones and conglomerates reappear, cut by a series of volcanic dykes. At Whirlpool Canyon are again replaced by a shaly limestone. These rocks are exposed from time to time as far as Portage Brulé, varying from imperfect calc-schists to crystalline limestone.

For ten miles below portage few rock exposures are seen through the glacial deposits of sand and gravel. Soft dark shales crop out at the mouth of Smith River, and can be traced for several miles; where the Rocky Mountains cross the river valley limestones again appear, extending for about six miles, where they are overlain by dark shales, generally rather hard. These persist as far as Hell Gate and beyond, interstratified with sandstone and limestone, the latter generally in thin beds. An anticlinal of an older limestone breaks through the plateau belt east of the foot-hills, 'the banks of the valley are usually scarped, show everywhere extensive sections of flat-lying shales.' These are dark in colour, are soft and finely laminated, and are interstratified with small beds of sandstone and ironstone and layers of ironstone nodules. They are of Cretaceous age, but their mode of junction with the Triassic shales of the foot-hills was not closely ascertained.

Towards the eastern part of the plateau belt the shales along the river are overlain by massive beds of soft sandstone and conglomerate, which form a steep escapement running parallel with the river.

East of the plateau belt few rock exposures appear through the sand and gravel deposits. They consist of dark and sandy shales and sandstones, still of Cretaceous age.

## EAST KOOTENAY DISTRICT.

**Railroad construction.** During the past year the construction was begun by the C. P. R. of the Crow's Nest Pass Railway from Fort McLeod, in the North-West Territories, through the Crow's Nest Pass, in the Rocky Mountains, thence across the valley of the Kootenay River and along the valleys of the Moyie and Goat Rivers to Kootenay Lake to Nelson. The company promises that by this autumn trains will be running over this road as far as Kootenay Lake.

The commencement of this railroad precipitated a great influx of prospectors, speculators, etc., last spring, a large number of whom started into the mountains to prospect, but only to encounter an unusually wet season that deterred a large majority from moving off the trails. Hence, after grub-stakes were gone, many of these at once left the country. But very little advance was made in East Kootenay during the past year, as very few discoveries were reported, and not much work was done on the old claims, as at the "North Star" and "Moyie" groups work was cut down to a limited amount of development pending the coming of the railroad and new conditions and facilities. Perhaps the most important prospecting was done by Captain Petty on Pyramid Creek, a small tributary of the St. Mary's River, which was examined by the writer, and is now reported upon as below.

On Perry Creek, the large ledges of quartz mentioned in the Report for 1896, received a good deal of attention, and Mr. John E. Hardman erected a small stamp mill for testing purposes, but the result of the season's work was that this quartz, so far as prospected and tested, proved to be very low grade and to carry very little gold that could be saved by any free-milling process.

From the "North Star" mine about 2,500 tons of ore were shipped to the American smelters, but the unfortunate wreck, on the same day, of two steamers on the Kootenay River, greatly delayed transportation of ore and supplies just at a time when they were most needed. Another and important discovery is reported on this property, but only about 12 men were at work developing.

Prospecting was done on adjacent properties, but work was suspended early in the year on the "Sullivan" group. At the "Moyie" some work was done on the adjacent claims, while on this property itself the ore shute discovered last year has been found to extend down to the lower tunnel.

### Coal and Coke.

The great coal fields of the Crow's Nest Pass are now being opened up in two places where the seams of high-grade coking coal are each from 6 to 7 feet thick. The work is in charge of Mr. Blackmore, M.E., who is opening up the properties so as to admit of a large production of coal on the completion of the railway, and is also erecting coke-ovens, so that when the railway reaches the heart of West Kootenay coal and coke can be at once delivered, at greatly reduced prices, at the smelting centres there, the price of coke delivered to be about \$6 per ton, the present price varying from \$12 to \$14.

These fields were examined by Geo. S. Ramsay, M.E., Denver, Colo., who says: "It is my opinion that the Kootenay coal field is the greatest in the Rocky Mountain series. I must say that I know of no coal field in the west where the evidence indicating large tonnage per acre is so prominent as I find it in the Kootenay fields." He also gives the following comparative table:—

#### STEAM AND COKING COAL.

Mine.	Fixed carbon.	Vol. matter.	Water.	Ash.
Crow's Nest No. 1 (entire vein) . . . . .	73.04	21.13	2.75	3.08
Crow's Nest No. 2 (lower part of vein) . . . . .	68.04	19.46	4.04	7.66
Crested Butte, Colorado . . . . .	56.93	37.23	4.12	5.50
Sunshine, " . . . . .	56.16	34.22	4.12	5.50

Mr. Ramsay also gives the next table.

#### COMPARATIVE ANALYSES OF COKE.

Crow's Nest, B. C. . . . .	Carbon, 91.97 . . . . .	Ash, 8.03 . . . . .
Crested Butte, Colo . . . . .	" 89.00 . . . . .	" 11.00 . . . . .
Cardiff and Sunshine, Colo . . . . .	" 87.13 . . . . .	" 12.82 . . . . .
Belt, Mont. (washed coal) . . . . .	" 91.00 . . . . .	" 9.00 . . . . .
Connellsville, Penn . . . . .	" 86.88 . . . . .	" 11.54 . . . . .
Trinidad, Colo. (washed coal) . . . . .	" 85.00 . . . . .	" 15.00 . . . . .

In East Kootenay, the construction of this railway and the opening of these coal mines will yet be a great influence, as more persistent prospecting will be done on both sides of the valley, up which a railroad may be run to Golden. The country lying between the headwaters of McMurdo Creek south to Toby Creek will be yet more thoroughly prospected, and bodies of low grade reported to be there will receive greater attention when better means of egress to smelters that may be erected much closer home, will encourage a much greater amount of work.

As no reports for 1897 were received at this office from the Gold Commissioner, no information is at hand concerning the progress of hydraulic mining on Wild Horse and other creeks.

### St. Mary's River.

About thirty miles up the St. Mary's River to the "Forks" by road and trail from Cranbrook, the intended divisional centre of the Crow's Nest Railroad, a fork of this river flows in from the north, up which, about two miles, a creek known as Copper, or now Pyramid, Creek flows from the north-east. A trail about five miles long, and rising 3,200 feet, leads from the mouth of Pyramid Creek up into a higher basin, whence one of the forks of this creek flows, and in which, at an elevation of 6,800 feet, Captain Petty had established a camp. This country can also be reached from the west by the Government-built trail that starts at Pilot Bay, or Crawford Bay, Kootenay Lake, passes up Crawford and Hooker Creeks to the summit (elevation

7,200 feet), and then traverses the valleys of the branches of the St. Mary's to the "Forks," and during the past season many travelled from Kootenay Lake to Fort Steele over this trail.

The mountains in this part of East Kootenay belong to the Purcell Range, and from any lofty elevation can be seen a far-stretching sea of lofty, sharp-crested summits, with deep, heavily-wooded valleys. Geologically these mountains comprise well-stratified quartzite slates, shales, and silicious limestones overlying, apparently, schists and gneisses, and broken through by areas of eruptive rock, from which intrusive sheets lie as if interbedded with the sedimentary rocks.

These bedded rocks have been tilted up to angles of 20 to 45 degrees, forming sharp-pointed ridges, and on the summits and along the steep sides of mountains surrounding this basin Capt. Petty had about 25 men engaged prospecting and opening up a number of claims located by his prospectors, and on which such as those examined, the "Warren," "Wolmer," "Brooks," "Kerrin," "Comstock," "Bailey," "Walsingham," "Albert," "Milton," "Stella," and others not visited, a variety of ores was being disclosed as work proceeded, gold-bearing copper ore in some of the veins, silver-lead in others, and, while the veins so far developed were small in size, some fine samples of ore had been got in this preliminary work. Nearly all the veins seen had a strike of N. 60° W. and a dip N. 30° E., or were vertical. They traverse both the stratified and the eruptive rocks, but none had been traced for any distance, or for more than a few hundred feet, although the surface is pretty well bared. Prospect work had just begun, and it was then too early to learn or decide what these veins or ledges would prove to be in size or value when work had been pushed well underground.

The camp was located near a small clump of trees that marked the extreme timber line which here lies at 7,000 feet, and by a good stream of water, and at the head of the basin was an encircling summit, elevation about 8,500 feet, beyond which to the north, locations had been made on both copper and silver-lead leads, whose dimensions and continuity were reported to be very promising. Work was being begun on some of these claims, and if this is proceeded with on a large scale during the coming season, it is said a road can easily be constructed up to these discoveries from the St. Mary's, by following up Split or John Creek, which flows into this river 10 miles east of the "Forks."

On the claims about the basin at the camp on Pyramid Creek, sufficient work was being done so that Crown Grants could be at once applied for, and should the existence of shipping ore in sufficient quantity be demonstrated on these claims to be described, transport will have to be provided by means of aerial tramways, now so successfully used in many mountainous districts. Of course at such elevations as those found at these claims, in winter there will be a great depth of snow, which will not interfere with mining after proper accommodations are supplied, and under-ground work is well advanced. While work on these claims at time of visit had not proceeded far, it is understood that Captain Petty will, during the season of 1898, continue the work on a much more extended plan, having received in the results of past season's work, the encouragement to do so. The following claims were examined.

#### WARREN.

Elevation 7,700 feet above sea-level by pocket aneroid. On this claim at the head of the basin a tunnel had just been begun on a vein, strike N. 30° W., dip S. 60° W. 50°, of hackly, white quartz, 12 to 15 feet wide. The vein was much decomposed by the oxidation of the mispickel or arsenical iron, but a small amount of coarse cubed galena was in evidence. Further up the hill this vein running in a very schistose slate, was 4 to 5 feet wide before it disappeared under the debris, but a few feet easterly was a very large exposure 20 to 30 feet wide at one place, of reddish weathering-white quartz almost perfectly barren of sulphides, which had not then been tested.

#### WOLMER.

Elevation, 7,800. This claim lies immediately north of the "Warren," the quartz-mispickel vein above mentioned passing into it, and 200 feet from the "Warren" tunnel a small test-pit was sunk 15 feet on a small quartz vein, carrying a considerable amount of galena, with some mispickel and zinc blende. On the surface there were 12 inches of good lead ore, and at the bottom nearly 2 feet, while on the dump were two tons of ore, the assay values of which had not then been determined. This vein is said to be traceable up the steep mountain side rising near here, but with work just begun, not more could be seen on these two claims which lie above snow line.

## BROOKS.

Elevation, 7,900 feet. On the steep bluff west of the camp, and along the sharp ridge running southerly from the "Wolmer," was a large exposure of barren-looking, crushed quartz, apparently lying conformable with the inclosing slates and quartzites. In a 10-foot hole were seen 3 feet of quartz, with stringers running into the foot-wall, but no values had been found, and this vein could not be traced beyond the small bluff.

## KERRIN, COMSTOCK, ET AL.

Along the same ridge but about three-fourths of a mile south of the "Brooks," was another group of claims located along a very precipitous rocky mountain side, on which the "Kerrin," "Comstock," "Bailey" and "Walsingham," were examined. At this point was a large intrusive interbedded sheet of fine-grained dioritic rock, which is found *en masse* in the basin of the camp, and to comprise large intrusive sheets interstratified in the bluffs, rising on the other or eastern side of the camp.

*Kerrin*—Altitude 6,550. Near the west side line, and 150 feet east of the "Comstock" shaft; a tunnel was in 10 feet, in the face of a bluff, on a vein of milky-white quartz, 2 to 4 feet wide, changing to a resin-coloured quartz with calcite and a small amount of copper pyrites, of which material no assays had been then made.

*Comstock*—Altitude 6,600. The same vein enters this property; strike, N. 60° W.; dip, N. 30°, E. 70°, but where work was being done, had passed out of the eruptive into the stratified or quartzitic rock. Very little was showing on the surface, but a small shaft was being sunk on a small decomposed vein, which, at 15 feet had widened to 15 and 20 inches of galena, chalcopyrite and pyrrhotite in a quartz-calcite gangue, yielding samples of very fine looking ore of which no assay values were then known. No efforts had been made to further trace this vein. Since time of visit, at 27 feet, the vein, after narrowing to nothing, has widened to 5 feet.

*Bailey*—Altitude, 5,900. Lower down the bluff, and to the west of the "Comstock," in the dioritic rock, was another vein of reddish-brown quartz carrying a very little copper pyrites, in which was a 15-foot tunnel and a 10-foot shaft, showing the vein to be 2 to 4 feet wide, but much broken up at the surface. At the time of visit, the shaft was being timbered with the intention of rigging up a windless, and then sinking to some depth to learn the conditions where the formation was solid and regular. On the

*Walsingham*—Altitude 5,950. Lying east of the "Bailey" and south of the "Comstock," work was in progress on a small vein of calcite 18 to 30 inches wide, in the eruptive rock, in which some copper pyrites were found near the surface, but none below the small test shaft, 15 feet deep, that had been sunk partly in the lime and partly in a streak, 2 feet wide of black loamy material, which evidently had been washed in where the easily corroded calcite had been eaten away and removed.

## ALBERT, MILTON, STELLA.

On the opposite bluff, or to the east of the basin, prospecting was being done on several claims, on which the veins, though as yet small in size, yet carried copper sulphides, and in one, beautiful samples of metallic copper in quartz, but of such the amount was very limited.

*Albert*—Altitude 7,000. A shaft was down 15 feet in ground, at the surface badly shattered, along a four-foot vein of reddish-brown quartz and calcite, carrying a small percentage of yellow copper sulphides. Along these bluffs the eruptive rock is apparently lying both intercalated with the quartzites and also cutting across them. This vein had not been traced for but it is seen to have a strong outcrop for over 100 feet.

*Milton*—Altitude 7,900. North of the "Albert," along the very steep mountain side. Here a vein of calcite and very white quartz, 2 to 6 feet wide, can be traced on the surface for about 50 feet, beyond which only quartz stringers are seen. A tunnel was then in 20 feet and while more sulphides and some metallic copper were found near the mouth, afterwards only a small amount of yellow copper came in along one wall.

*Stella*—Altitude 7,650. A small quartz vein, 8 to 16 inches wide, in this same eruptive rock was being prospected by a tunnel, 3 by 5 feet, showing again the yellow copper sulphides, but 1,000 feet north on the same claim, a ledge of galena and mispickel had been found almost directly opposite that one found across on the other side of the basin on the "Warren" and on which some work was being done.

## OTHER CLAIMS.

To the west and north other locations had been made on copper and lead ledges, and a strong galena vein was reported as easily traceable through four claims, but as time for inspection was limited, no more prospects were visited, although prospectors were here and there staking claims over a considerable extent of country.

## WEST KOOTENAY DISTRICT.

## AINSWORTH DIVISION.

There has been increased activity here during the past year, but still many properties are lying idle. Again the fall in silver proved disastrous, as money becoming interested here to a great extent withdrew.

*No. One.* Mr. L. Shaw has maintained the out-put of this mine, and high grade concentrates are being shipped.

*Tariff.* The incline has reached a depth of nearly 300 feet, and considerable water has to be handled. Braden Bros. are shipping the ore to their concentrator at Pilot Bay.

*The Highlander.* An aerial tramway and concentrator were put in for this property, but little or no ore has been taken out.

*The Black Diamond* is shipping ore over this tramway to this mill and getting a very good product, but no work is being done on the *Little Phil*.

*The Highland* is still prospecting, but shipping no ore.

*The Skyline* and *Neosha* are shut down.

*The Canadian Pacific Milling Co.*, at the mouth of Woodbury Creek, after installing a fine water-power and concentrator, were shortly afterwards forced to shut down for lack of ore.

## TAYLOR AIR-COMPRESSOR PLANT.

At the mouth of Krao Creek, and using the water of Coffee Creek near the town of Ainsworth, Mr. Norman is installing for the Kootenay Air Supply Company a Taylor air-compressor plant, by which it is expected to generate about 500 h. p., and to transmit this air in a 9-inch main under 90 lbs. pressure to the mines, where branch lines can be diverted.

This system is very interesting, and is giving great satisfaction at Sherbrook, P. Q. The principle is as follows:—A shaft will be sunk 200 feet down, which will pass a wooden stave pipe to a bell or air trap. The top of this pipe will be about 19 feet above the top of the shaft, so that water flowing down sucks down many bubbles of air, which are trapped in the bell and led thence by the air-pipe to the main, the pressure depending upon the depth of the shaft. Hence once installed very little more is required, as the water and air flowing down this pipe maintains a steady supply of wonderfully dry air. This method of compressing air is patented.

## SOUTH FORK OF KASLO.

The *Montezuma* has developed a large body of zinc-galena concentrating ore, and a concentrator has been erected by Mr. T. L. Mitchel, who will operate it. The *Gibson*, on Cariboo Creek, is now shipping silver-lead ore, while on the *Silver Bell*, nine miles up the South Fork, ore has been found from which a shipment will soon be made.

## KASLO CREEK.

**Whitewater Mine.** This mine has shipped much more extensively during the past year, and very heavy shipments are being made this winter. Contiguous properties are being prospected, one by Mr. J. E. Boss, who is driving a long tunnel to tap the "Whitewater" vein. The "Whitewater," up to January 1st, 1898, had paid \$123,000 in dividends, or \$87,000 in 1897.



The *Charleston*. Mr. Mitchell has stuck manfully to this property, and has met his well deserved reward by disclosing, 300 feet in his lowest tunnel, a fine body of high grade ore, along which, at last account, the drift had run for 12 feet, leaving a body of ore nearly 4 feet wide, from which an average sample is stated to have run 720 ounces in silver. A shipment is now being made.

The *Ibex* came to grief during the summer, and the affairs of this company have been wound up.

Up in Jackson Basin work has been discontinued, for a time at least, on the *Northern Belle*, or as known as the *Jackson Mine*. Capt. R. C. Adams has been driving a long tunnel to explore the *Bon-Ton* claim.

The *Eureka*, north of Kaslo Creek, under the charge of Mr. J. C. Ryan, is shipping two to three carloads a month of silver-lead ore.

#### DUNCAN RIVER.

Much prospecting was done during the past season in this region, resulting in the discovery of silver-lead ores up in the same formations as found in the Trout Lake District, the great up-tilted belt of lime extending down this far.

On the *Levinah* group, between Glacier and Grizzly Creeks, east of the Duncan River, a good body of galena ore, running 50 ozs. in silver, is reported to have been found near the "lime dike," and a small body of men is at work.

The Dominion Government has instructed their engineer for the Province, Mr. Roy, to examine the Duncan River as to the possibility of opening it up for navigation by small steamers.

#### THE TOWN OF KASLO.

This town had a return of prosperity during this season, and many new buildings were put up, but at the present time trade is very quiet, as the tide of transient strangers has greatly decreased, and men are saving up for the Klondike.

#### PILOT BAY SMELTER AND CONCENTRATOR.

These works have passed into the control of Braden Bros, who are using the concentrator only for ore from their properties, the "Tariff," "Lucky Jim," etc., but it is understood that there is no intention of blowing in the furnace for some time at least.

#### ILLECILLEWAET DIVISION.

This was the only mine visited in this Division. Unfortunately, it has so far proved to be very disappointing to the Lillooet, Fraser River and Cariboo Gold Fields, Ltd., as the amount and value of the ore reported to be in sight to the company, has since proved to be utterly at variance with the results obtained in the mining and milling of this ore-body. The management of this mine incurred a large and premature expenditure by the hurried erection of a concentrating mill, tramway and expensive buildings before the mine had been developed enough to warrant this out-lay. So necessary, for various reasons, were these buildings considered that they were erected in midwinter at a far greater cost than would have been required later.

At this mine the first tenet of good mining was disregarded in that, instead of commencing on a vigorous plan of development and search for other ore-shutes, a large gang of men was set to work to stope out all the ore in sight, which they did with the consequence that when this ore-body was exhausted and nothing had been done to look for more, work came to a stand-still.

A very full account, taken from the company's statements, was in the Report of the Minister of Mines for 1896, which need not be repeated in this.

The most important ore-body was found on the "Lanark" claim in this group that lies about 1.5 miles north and 2,500 feet above the small station of Laurie, on the main line of the C.P.R., a few miles east of Revelstoke. The very precipitous mountains of the Selkirk Range here consist of steeply tilted, contorted carbonaceous schists interbedded with narrow



ONE SPAN, OTTO TRAMWAY, LANARK MINE.



CONCENTRATOR, LANARK MINE.



ARROWHEAD, WEST KOOTENAY. MATTE FROM HALL MINES TO SWANSEA SHOWING ON THE BARGE.



bands of limestone, similar to the formations found further south in the Trout Lake Division. Little or no eruptive rock, as dykes, etc., were seen near this mine, but the ore body was found to occur in a body of shattered limestone and to be apparently conformable with the enclosing schists.

This ore-body was discovered by short drifts run in near its apex where its greatest width of ore, or 20 to 25 feet, was encountered, then a long tunnel was driven lower down the mountain side striking this body at about the 400-foot level. From this level all ore has been stoped out up to the surface and, as to the dimensions of the shute, the thickness decreased from 15 to 25 feet in the upper workings to 4 and 5 feet in the lowest, with an average width of 7 feet, while its length, or along the strike, was from 50 to 100 feet with 65 on the 400-foot level.

The ore consisted of argentiferous galena and barren iron pyrites in a gangue of quartz and limestone, and while a considerable amount of nearly solid ore was found, yet the sulphides were scattered in very irregular proportions throughout the mass, and little or no attempt was made at the mine to hand sort, but everything was sent down to the mill. The straight or clean galena ore was evidently not very high-grade in silver as the concentrates ran from 57.5 to 64 ounces in silver per ton and 66 to 72% lead.

Considerable work had been done in former years on other claims in this group, notably on the "Maple Leaf," and considerable mixed ore, but no well-defined ore-shute had been found. At present only three or four men are at work doing some development which will and should be done much more extensively after the snow leaves these mountains in the spring.

The Otto wire rope tramway with two spans, each over 2,000 feet long in the clear, a total length of 6,550 feet, and difference in elevation between terminals of 2,640 feet, capacity, 100 tons in 10 hours, gave excellent satisfaction, and the cost of tramming down the ore to the mill was about 30 cents per ton.

The concentrator was erected at the track of the C.P.R., and the necessary power was got by throwing a dam across the Illecillewaet River and building 3,000 feet of fluming. An electric power and lighting plant was also installed. The future of the property now depends upon the results of extensive developing and prospecting that will now have to be done, and should shutes of good ore be found, then every facility for its convenient transport and milling will be at hand, but the company has not announced the policy it proposes to follow.

#### REVELSTOKE DIVISION.

As this division was not examined and no reports were sent in by the Government officers, no information is available for this Report of the progress of mining and prospecting.

#### NELSON DIVISION.

The Town of Nelson has grown very rapidly during the past year, many new buildings having been erected, as, from its location on the lake and on the different lines of railroad, it must always be an important and central point. Considerable development has been in progress throughout the district, with good results, as at the "Ymir," "Porto Rico," "Fern," "Dundee," "Athabasca," etc., and several other claims are said to now promise well. Not much was done on the "Poorman" or the adjoining properties. The writer visited no mines in this district during the year.

#### THE HALL MINES, LTD.

This mine was not seen this year, but the production of ore has been well sustained throughout nearly all the year. Mr. Croasdaile, General Manager, reports that a new ore body has been found, that is now thought to be at least 300 feet long, 12 feet wide, and to average nearly 50 ounces in silver per ton. The Hallidie tramway, probably the severest of its type ever erected, is working very well, and automatic loading devices are being attempted.

At the smelter, Mr. R. R. Hedley took charge on the resignation of Mr. Paul Johnson, a , besides doing excellent work, has made some very important alterations and additions in

the refinery, where there are now two roasters 18 by 50 feet, and two reverberatory furnaces 12 by 18 feet, for calcining and refining to a product of 98 % copper, which is sent to Balbach's refinery, Newark, N. J.

Mr. Johnson designed and erected what is probably one of the largest copper blast furnaces in existence, or 44 by 144 inches at the tuyeres, and Mr. Hedley says that it is giving every satisfaction, despite the low percentage of copper in the charge. The former copper stack has been converted into a lead furnace 42 by 100 inches, and before long the smelting of Slocan lead ores will be attempted here, although further roasting plant may be requisite. In the *Engineering and Mining Journal*, December 11th, 1897, Mr. Hedley has the following interesting article on—

#### MATTE SMELTING AT THE HALL MINES.

"The matte smelting blast furnace in use at the works connected with the Hall Mines in British Columbia is probably the largest furnace of its kind in North America, which is equivalent to saying in the world. It has now been in blast sufficiently long to demonstrate its capabilities, and the following description will be undoubtedly of interest:—

"The furnace was blown in September 5th, and had worked to November 5th, the day of writing, 60 days. During that time, it smelted 14,676 tons of charge, of which 1,587 tons was barren flux, chiefly limestone. This shows an average of 244.9 tons smelted daily. Under favourable circumstances, it is possible to smelt 300 tons per day, as proven by the 24 hours ending 6 a.m. November 5th, the actual tonnage passed through the furnace being 273.9 tons ore and 30.1 tons limestone, and again, on October 30th, 277.2 tons of Silver King ore and 30.8 tons of limestone. The average tonnage for the seven days ending November 5th was 282.5 of charge. In addition to this, note may be taken of the fact that 200 lbs. of slag are added to every ton of charge.

"The percentage of coke varies between  $14\frac{1}{2}$  and 16 %, according to the quality of the coke and the amount of sulphur in the charge.

"The matte produced during the period of 60 days mentioned was 1,029 tons, averaging about 49 % copper, wet assay. The concentration is about 14.25 parts of charge into one of matte, but the furnace has run successfully with a concentration of 20 to 1. A great point in favour of this furnace is that it will handle a very large proportion of fine ore.

"The character of the ore is chalcopyrite, bornite, tetrahedrite, and kindred minerals in a variable gangue, which gives an average composition of silica, 33 %; ferrous oxide, 9.5 %; manganese oxide, 8 %; lime, 7.5 %; magnesia, 4 %; alumina, 15 %; copper, 4 %; sulphur, 3.2 %. Limestone, the only flux generally used, carries 10 % silica, and the resultant slag has a composition of silica, 43 %; lime, 15 %; ferrous oxide, 12 %; manganese oxide, 9 %; alumina, 18 %. Slags have averaged for two months 0.345 % copper and 1.15 silver per ton.

"This furnace was designed and erected by Mr. Paul Johnson, late superintendent of the works. Its dimensions are: At tuyeres, 144 in. by 44 in.; at top of jackets, which are 5 feet 6 inches high, 144 in. by 64 in.; and at feed-floor, 160 in. by 72 in. The top height of the columns is 12 ft. 6 in., but the charge is generally maintained 4 ft. lower, varying, however, with conditions of charge, etc. The tuyeres, eight in number on each side, are reduced from 6 in. to  $4\frac{1}{4}$  in.; the centre of the tuyere is 24 in. above the bottom, as originally constructed. The bottom is supported by a cast-iron plate, resting on six jack-screws carried by a truck, and consists of a coil of 2-in. water pipe bedded in steep (brasque), and a course of fire-brick on end. On this the furnace makes its own bottom, which probably is now about 4 in. higher.

"Provision is made for tapping on the side, but the end tap only is used. The flow is practically continuous, separation being made in a large conical pot of special manufacture. A second settler is used, of similar form but smaller, and thence the slag flows into a powerful stream of water. It would be interesting to know if there are other furnaces in service that have dimensions similar to this, and what their capacity is."

During the past year, to December 31st, 47,560 tons of "Silver King" ore have been smelted, yielding 954,585 ounces of silver and 3,453,644 lbs. of copper, and a little gold. Hence the average *yield* of the ore for the year per 2,000 lbs. has been 20.7 ounces of silver, .04 ounces of gold, and 3.63 % copper, or \$16.81 per ton.

**Dividends.** While guaranteed dividends of seven per cent. have been paid on the preference shares, the first dividend of ten per cent. upon the ordinary stock was declared, or a total dividend of \$133,750 for 1897, or \$160,000 in all to date.

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### THE FERN MINE.

This company, during the past season, erected a 10-stamp mill and built a 3-rail gravity tramway down from the mine. Since the stamps began to drop, there have been two clean-ups, yielding \$28,500 at a cost of \$12,000 in three months, and from the second clean-up, after crushing in 44 days 1,251 tons, the yield per ton was \$7.70 caught on the plates, and \$1.55 in the concentrates, or \$9.25. Besides this mill-rock, some ore is sorted out and sent to the smelter at Nelson. Development work is progressing, and it is the intention of the management to enlarge the plant, and perhaps to add a cyanide plant, as the work is reported to be showing up a fast-increasing amount of ore. A dividend of \$10,000 has been declared.

### ATHABASCA.

On Toad Mountain, this property is being developed, and during the year several shipments of ore were sent down to the smelter *via* the Hall Mines Tramway; ore that ran from 1.2 to 5.2 ounces in gold per ton and 4 to 7 ounces silver, or an average of 3.3 ounces of gold and 5 ounces of silver per ton.

### Ymir.

This group, on the North Fork of Wild Horse Creek, is being extensively developed by the London and B. C. Gold Fields Co., Limited, under the direction of Mr. S. S. Fowler, M.E. A waggon road has been built from Ymir Station on the N. and F. S. R.R., to the mine, where nearly 2,500 feet of work have been done, and a large body of good ore carrying, in quartz and galena, pyrites and blend, both silver and gold value, has been found. The mine is being thoroughly opened up, while in the meantime the method of treatment best suited to this ore is being carefully studied.

### PORTO RICO.

The Canadian Pacific Exploration Co., Ltd., Eng., is opening up this property on the North Fork of Salmon River. A road seven miles long has been built from the N. and F. S. R.R., and three tunnels on the vein, now aggregate 700 feet of work. Good buildings have been erected. A shipment of 41 tons was recently made to the smelter at Trail, which is reported to have yielded \$76.25 per ton in gold. This Company is also developing the *California* on Toad Mountain, where the mine is said to be looking very well.

### OTHER CLAIMS.

*Dundee* is being opened up on a lead of silver-gold ore, and about 14 men are at work; while near Ymir the following are said to be working:—The *Wilcox*, with 10 men; the *Porcupine*, with 8 men; the *New Brunswick*, with 8 men; the *Union Jack*, with 4 men; the *Jubilee*, with 10 men; the *Roanoke*, with 3, and the *Tamarac*, with 10.

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### SLOCAN DIVISION.

During the past year this Division was sub-divided into three recording divisions, but in this report the term "Slocan" will refer to the territory within the old boundaries. Unwittingly, in Bulletin No. 3, several mines as the "Whitewater," "Washington," "Northern Belle," etc., were spoken of as being in the Slocan, instead of in the Ainsworth Division.

The following tables give the *net smelter returns* of ore from the Slocan District sold during the years of 1896-7. The tonnage is the dry weight of the crude ore and concentrates shipped, *i.e.*, with the moisture deducted. The silver and gold values represent 95 % of the assay values, and the lead 90 %, as the smelters do not pay for the balance.

The average market values at New York have been taken, or for silver for 1896, 67 cents, and for 1897, 59.8 cents per ounce. For lead for 1896, \$2.98 per 100 lbs., for 1897, \$3.58.

## NET PRODUCTION PER SMELTER RETURNS.

Years.	Tons. 2,000 lbs.	Silver, Oz.	Lead, lbs.	Gold, Oz.	Values.
1895 .....	9,514	1,122,770	9,666,324	6	\$1,045,600
1896 .....	16,560	1,954,258	18,175,074	152	1,854,011
1897 .....	33,576	3,641,287	30,707,705	193	3,280,686
Totals .....	59,650	6,728,315	58,579,103	351	\$6,180,297

## ACTUAL YIELD VALUES PER TON.

Years.	Silver.	Lead.	Value.
1895 .....	118.0 oz.	50.8 %	\$109 90
1896 .....	118.0 "	54.9 "	111 95
1897 .....	108.5 "	45.7 "	97 71
For 59,650 tons .....	111.42 oz.	49.1 %	\$103 60

**Dividends.** The actual amount paid in dividends cannot be stated, as some of the mines never make their profits public, such as the now famous "Payne," but it is known that the total amount is at least \$1,800,000, of which \$960,000 were paid in 1897. The following mines have stated publicly their dividends:—"Slocan Star," \$400,000; "Reco," \$287,500; "Idaho," \$220,000; "Rambler-Cariboo," \$40,000; "Goodenough," \$32,500; "Last Chance," \$37,000.

**Progress of Mining.** In the autumn of 1896 and the winter of 1897, the silver mines of the Slocan attracted unusual attention, as the great money making possibilities of very high-grade silver-lead veins became apparent. A real boom was inaugurated, the different towns built up rapidly as many people crowded in, but in July the sudden drop in the price of silver checked all speculation and the boom was over.

The increased out-put of the Slocan for 1897 speaks for itself, while the record of some of its mines during the past year attracts much attention. One significant feature during the year has been that despite the fact that gold is the favourite and silver has fewer friends, several of the larger and developed properties have passed under the control of British capital, and others are being examined with a view to purchase, the fact being realised that this high-grade Slocan silver-lead ore is exceedingly profitable, and yielding handsome dividends.

No new properties attained special prominence during the year, but several of the older claims forged ahead and became heavy shippers, such as the "Payne," "Ruth" and "White-water," and several, such as the "Queen Bess," "Charleston," "Ivanhoe," "Last Chance," etc., are reported to have good ore shutes now in sight, but no mines were visited by the writer during the past season. First, but small, shipments were made from quite a number of new claims, development work is progressing in many places, and remembering how every good property in the Slocan had very insignificant surface prospects, it is impossible to tell when a good ore-shute of this high-grade ore may be struck, and a mine hitherto little known suddenly spring into prominence.

Many prospectors and miners are preparing to join the great rush northward to the gold fields, and their unusual economy is being felt in all the towns, but this hegrira will not be an unmixed evil, as the prices asked for prospects are already falling rapidly, and in all probability in spite of quieter times, more and better development work will be done, as it will be found that many, if not more purchasers will be now in search of good properties.

**Railroads.** Since last report the C. P. R. has built and opened its branch line from Slocan City to Slocan Crossing on the Nelson and Robson line, and a large new steamer runs twice daily from Slocan City to Roseberry, where it connects with the Nakusp and Sandon branch. The K. and S. R. is considering the extension of this line northward from Kaslo and up the Duncan River, to open up that large section of country.

**Smelting.** Little or no reduction in freight and treatment charges has been obtained, the charges running from \$20.50 to \$22 per ton. The American smelters are eager to get this ore and those to the south, as in Colorado, charge \$1 50 to \$3 per ton smelting charges on the net weight (*i. e.* less moisture) and \$19 a gross ton for freight. This is a flat rate, that is, no account is taken of silica or iron contents, only excess of zinc or over 10 %, and in some contracts 12 %, being paid for at fifty cents per unit. Of course the smelters of shorter haul, as on Puget Sound, charge higher smelting rates to make up the difference in lower freights.

*Silver* is paid for at New York price at time of settlement for 95 % of assay value, and *lead* also up to 90 % of assay value.

The *duty* is 1.5 cents on every pound of lead in the ore as exported to the United States, although the smelter only pays the miner for ninety per cent. The ore is shipped in bond to the smelter, where the smelter men pay the duty, after sampling, to the United States Government out of the value of the ore, or else they retain this duty charge, and ship refined lead to Europe when the prices there, always lower than in the United States, are such as to admit of a margin of profit by adding the amount of the duty to their selling price. Hence the mine-owner always pays this duty charge on lead.

The Province levies a tax of 1 per cent. on the value of the ore after deducting freight and treatment charges. Hence the average ore for 1897 *yielding* 108.5 ozs. silver and 45.7 per cent. lead, at the average prices for 1897, would be worth \$97.70 per ton, from which have to be deducted:

Freight and treatment.....	\$22 00
Duty on lead (100 %). .....	15 25
Government tax .....	75
	<hr/>
	\$38 00

Besides the cost of mining, sacking and transport to point of shipment, so that the net value or profit on *average* Slocan ore will be about \$50 to \$55 per ton.

*Sampling Works* are running at Kaslo, and it is proposed to put such a plant at Roseberry for ores going out on the C.P.R. Nearly all the larger mines ship direct to the smelter, some sending alternative lots to different smelters. The price of sampling is \$1.50 per ton, and the sampler is prepared to buy the ore outright after sampling.

*Transportation.*—The ore is shipped in sacks to the cars, and at Five Mile Point, when loading from the steamer to the N. & F. S. R. R., the sacks are emptied, the ore going in bulk, so that the mine-holder gets far more use for his sacks. Facilities for the shipment of ore are constantly improving, but the railroads and boat lines prevent reduction in charges.

#### THE MINES.

**Payne.** A little over a year ago the half interest in the "Payne" and adjoining claims was purchased for \$87,000 by the owners of the other half, and since then this mine, the first located in the Slocan, has taken first place as shipper, and for the past year has paid its owners, who are very reticent, the largest dividends of any silver mine in the Province. To-day there is said to be now opened up by tunnels and raises a very long shute of ore, from which a daily shipment of fifty tons can be easily maintained for a long period. The cost of mining is very low, very little dynamite being required, and for transporting ore to both the K. & S. and the C. P. Railroads probably the longest three-rail gravity tramway in the world has lately been completed. This tramway is 6,000 feet long, with a vertical drop of 2,500 feet; steel cable,  $\frac{3}{4}$ -inch; load per car, 5 tons; average time of descent, 8 minutes. It passes over trestles for much of the way, but is covered where needed by snow-sheds. At the upper end is a Blake crusher, so that the ore is very easily sacked, little or no sorting being done other than that in the stopes.

**Slocan Star.** This mine has not been as heavy a shipper during the past year, but the concentrator is kept almost constantly running. The lower tunnel struck the ore-shute, which here so far proves to be concentrating ore, and development work is being pushed.

**Ruth.** The controlling interest in this property has passed since last report into the hands of an English company, and during the past year this mine has risen to be one of the largest and most constant shippers in the Slocan, while work is being advanced rapidly.



**Reco.** On this mine work has been confined to the "small vein," nothing further having been done on the larger. The different tunnels have been advanced, and recently some of the best ore ever found in the mine, carrying much pyrrargyrite or ruby silver in the galena, has been uncovered. A line for an aerial tramway has been cut out from Sandon to the mine. The mine is closed entirely when snow-slides begin to run in the spring, and considerable water comes into the workings. A dividend of \$100,000 was declared January 1st, 1898, making \$287,500 in all, and another is promised to be paid soon. Mr. Harris is also prospecting several claims adjacent.

**Idaho-Alamo.** This property last summer passed into the control of the Scottish Colonial Gold Fields, Ltd., and much work is being now done to further develop these and the "Cumberland." The concentrator has had some radical changes made, and at the present time 2,000 tons of high grade ore are ready for milling.

**Last Chance.** In this mine the discovery of very fine ore shutes is reported by the manager, Mr. T. A. Woods, so that this property will probably become one of the most important shippers during the present year.

**Noble Five.** This mine was forced to suspend work on account of the lack of funds, and indebtedness. The concentrator and Finlayson tramway, mentioned in Bulletin No. 3, were erected and exploratory work vigorously prosecuted, but, as has since transpired, the large expenditure for tramway and mill was premature, as not much pay-ore was found and the mine soon drifted behind, and with no capital to go further, had to face the inevitable and shut down. Arrangements are now being completed to permit continuance of development under other and better conditions.

*The Washington, R. E. Lee, Rambler-Cariboo, Best, Antoine, Surprise, Great Western* are still being developed and shipping ore, but work has stopped on the *Slocan Boy, Argo, Carnation, Reed and Tenderfoot, Monitor*, etc.

**Lucky Jim.**

This mine is now shipping several cars per day to the Pilot Bay concentrator from its large reserves of concentrating ore.

**Dardanelles.**

This company, having well equipped this mine, is now developing and has found, as reported by Mr. Tretheway, in the lower workings the continuation of the ore shute worked in the upper workings by the former owners.

Work is progressing on other properties, from some of which small shipments of typical Slocan ore are being made, and it can hardly be doubted that other mines will soon be added to the list ere long.

**Queen Bess.**

This property is now owned by the Queen Bess Proprietary Co., England, and it is reported that the work done during the past year has shown up much more ore, from which shipments are being made.

*Galena Farm*, or *Galena Mines Company, Ltd.*, England. When this property was visited in 1896 it was then seen to be one of the most promising prospects in the district, but everyone was amazed on learning that this undeveloped "prospect" was to be overwhelmed by the excessive and absurd capitalization of £550,000, or \$2,575,000, and burdened by promises of speedy dividends. The upshot was inevitable. Even yet only a few hundred feet of work has been done, far from enough to prospect but very little of this ground, which, with more extensive development, has many chances of yet proving up well even if at present not much good ore is in sight in this strong ledge, although a very decided improvement is now reported. In the Report for 1896 the presence of zinc blende was mentioned twice, but this mineral is found in all the Slocan mines to a greater or less degree. This property has not had justice done to what was showing a year ago, and it is simply absurd to condemn it altogether. An excellent plant operated by water-power is installed, but for some reason or another the air-compressor, all ready for work, has not been used. A few hundred feet of work on such a property may, as is many times the case, prove nothing of value, while more extended work may, but it is extremely dangerous to make promises of large dividends to the shareholders before the pay-ore has been found and blocked out in sufficient quantities to warrant such promises.

*The Wakefield, Thompson, and Vancouver Groups*, up Four-Mile Creek, are stated to have good showings of ore, and shipments are being made this winter from the last two. *The Fisher Maiden* resumed work for a time under Mr. Frank Watson.

*The Enterprise*, on Eight Mile Creek, has been developing throughout most of the year and shipping ore, but much heavier shipments are being made this year.

## SLOCAN CITY MINING DIVISION.

A good many claims were bonded and explored during the past year, but not much advance was made, as the veins seemed to be broken and irregular, and the high grade ore scattered in "segregations along minor line of weakness." Messrs. Gwillim and Johnson, mining engineers, Slocan City, have kindly sent the following notes:—

**Ten-Mile Creek.** *Enterprise.*—Work was suspended for a time, but resumed Nov. 1st with 40 men. Contracts have been let for the hauling of a large quantity of ore during this winter to the lake. Drifts and upraises are being run.

*Kahspel.*—Four or five men are at work, and a 5-ton shipment was made in December to the Hall Mines Smelter.

*Highland Light.*—Three miles up Ten-Mile Creek on the north side two men are at work driving a tunnel (35 feet long) on a vein of high-grade dry silver ore, or native and ruby silver.

*Victor.*—In the same section and under the same owners two men are working in a 92-foot tunnel on the same kind of silver ore.

*Silver Nugget.*—This claim lies in Eight-Mile Creek basin over the summit from the "Victor," and a few men are working on very rich silver ore carrying nugget and wire silver, of which ore 5 tons were shipped to the Hall Mines Smelter in December.

*Twelve-Mile Creek.*—Work has been carried on during the fall and early winter on the dry ore carrying argentite and pyrites, chiefly at the "Paystreak," "Eli" groups and "Jubilee" from the first of which seven tons were shipped to the Hall Mines Smelter.

**Springer Creek.** *Arlington.*—On the "Arlington" Mr. Frank Watson has 12 men at work, the shaft having been sunk to 160 feet and drifts run off at different levels. A steam hoist has been put on, and some fine ore is reported, of which two car-loads were sent to the Hall Mines Smelter in December.

*Two Friends.*—Six men are at work and some ore is being taken out, one car having been shipped in the fall. A second vein is being opened up.

*Meteor.*—In the fall 6 to 10 men were at work, but during the winter only 2 or 3. Three car-loads of high-grade ore, running from 160 to 257 ounces of silver and \$6 to \$14 in gold per ton, were shipped during the fall.

*Columbia.*—Three men were at work, and a 200-foot cross-cut tunnel, with drifts along the vein of the dry silver ore, had been run.

*Evening Star.*—This claim is now under bond to Hugh Sutherland, of Winnipeg. A shipment was made in November of rich silver ore, but no work is being done at the present time.

*Exchange, Victoria, etc.*—Until the early part of December 14 men were at work, but none at present, shafts having been sunk and drifts driven.

*I.X.L. and Excelsior.*—Seven men are at work, and there are now a 55-foot shaft and an 85-foot drift.

*Republic.*—Is being worked by the original owners who will ship a car-load of silver ore in January.

**Lemon Creek.** *Howard Fraction.*—Work is now suspended. During the past summer a cross-cut tunnel was driven and some drifting done, and two or three car-loads of ore taken out.

*Gold Wedge.*—From this mine a trail has been built through Kootenay Pass to Kootenay Lake. Twelve men were working and some rich ore is reported as being taken out. This claim is on the second North Fork of Lemon, east of the "Crusader" group.

*Crusader.*—A 60-foot shaft has been sunk; a few tons of ore are on the dump, and the owners, Faas and Crawford, are now working.

*Kilo.*—Eight men were at work, and a small shipment of gold ore was sent to the Hall Mines Smelter. Located on the first North Fork of Lemon Creek.

*Alberta.*—Is being worked by Beauchesne and Livingstone, and a small shipment has been made to the Hall Mines Smelter.

*Chapleau.*—The original owners now have 4 men at work, and there are two shafts 80 and 60 feet deep with short drifts. Two car-loads of rich ore were shipped late in the year, of which one 20-ton lot ran 5.62 ounces in gold and 60.3 ounces in silver per ton.

*Cameronian.*—About two car-loads of ore on the dump, ore being sacked for shipment. Little or no development is being now done. There is an 80-foot shaft.

*Alpine Group.*—Considerable work was done on this property by Alex. Dick during the past year, but all work is now shut down.

### TRAIL CREEK DIVISION, OR ROSSLAND.

Since the writing of the last report (August, 1896) on this district, some important events have occurred, and while no other paying mines have yet been developed, "persistent, plucky development work, sustained by ample capital," is now being done on several properties, with very encouraging results, and extensive operations will soon be begun on other claims, work that should definitely determine the existence or no of other ore-bodies in this camp.

A great many people have been attracted to Rossland, where a large, well-built town has sprung up as in a night. Prices for all kinds of mining claims in this vicinity became for a time abnormally high, if such had rusty-stained rock with a little pyrites (and such can be found almost anywhere here), erroneously called "iron-capping," that promised "high values in depth." Many companies were formed, and a few thousand dollars of treasury stock sold, but this proving entirely inadequate to do other than a few hundred feet of work, without discovering ore or proving up a "mine," a great many of these companies have collapsed entirely. Nothing more will be heard of them, and their claims, such as seem to possess merit, will pass into other hands.

As in every other mining centre of prominence, Rossland had to suffer for a time from the selfish machinations of the "wild-catter" and unprincipled boomster, the public at large swallowing nearly everything that was offered them for a while, the phenomenal rise in value of the "Le Roi" stock from a few cents a share to dollars proving an irresistible bait. The reaction speedily came, and most of this bubble speculation disappeared. The result was a sudden rebound from feverish activity and speculation to quietness, but this camp has at last settled down to a more business-like basis, and as work increases, and likewise the pay-roll, so, proportionately, will be its prosperity from now on.

The following table will be interesting in that it gives, within a narrow margin of exactness, as determined by actual smelter returns, the output of the Rossland mines for each year from the beginning to date. It must be remembered that this table is according to the *smelter returns received* during each year, so that nearly all the ore shipped in December has to be credited to the following year, or the issue of this Report would be delayed until much later.

This table gives the *actual yield values* of the ore as paid for by the smelters, or 95 % of the assay values in gold and silver, and the amount of the wet assay of copper, less 1.3 %, and also the net weight of ore, or less the moisture.

#### NET PRODUCTION, PER SMELTER RETURNS.

Year.	Tons, 2,000 lbs.	Gold, oz.	Silver, oz.	Copper, lbs.	Value.
1894 .....	1,856	3,723	5,357	106,229	\$ 75,510
1895 .....	19,693	31,497	46,702	840,420	702,459
1896 .....	38,075	55,275	89,285	1,580,635	1,243,360
1897 .....	68,804	97,024	110,068	1,819,586	2,097,280
Total .....	128,428	187,519	251,412	4,346,870	\$4,118,607

#### AVERAGE NET SMELTER RETURNS, OR ACTUAL YIELD VALUES PER TON.

Year.	Gold.	Silver.	Copper.	Value.
1894 .....	2.00 oz.	2.89 oz.	2.85 %	\$ 40 69
1895 .....	1.60 "	2.41 "	2.10 %	35 67
1896 .....	1.45 "	2.34 "	2.08 %	32 65
1897 .....	1.42 "	1.60 "	1.32 %	30 48
Average, 128,428 tons .....	1.46 oz.	1.96 oz.	1.73 %	\$ 32 05



**LeROI COMPRESSOR PLANT.**



**LeROI SHAFT HOUSE.**

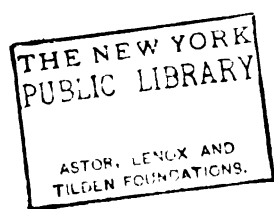


**CENTRE STAR GULCH.**



**NICKEL PLATE MINE.**

**VIEWS AT ROSSLAND.**



From the above values, the cost of mining, transportation, treatment, and Provincial Tax has to be deducted, or, calculating from scanty information, from \$15 to \$18, leaving a net value or profit for the production of 1897, of from \$12 to \$16 per ton.

**Dividends.** To date, February 1st, 1898, the "Le Roi" has paid \$725,000 in dividends, of which \$400,000 were paid during 1897. The "War Eagle" has paid \$187,000, but none since 1896.

**Capital and Sales.** It was early realised that abundant capital would be a *sine qua non* in Rossland, that a weak company would run every risk of failure, despite the fact that the "Le Roi" and "War Eagle" were opened up with comparatively limited means, as their rich pay shutes so happened to come to, or near to, the surface, but since last report several strong companies have made important purchases of mining land, and others would have done so but for the prohibitively high prices then asked for "prospects." Rossland cannot complain of lack of attention from capital, as few mining camps during the last two or three years have been so studied by capital's agents from all parts of the world, attracted by the gold ores, but deterred from purchasing by reason of this being not a milling ore, or by the high figures demanded for ground valuable only as yet by its location in reference to property already proved up—a very doubtful value except for speculation.

The first important sales were those of the "War Eagle," in 1896, to Toronto capitalists, for the reported sum of \$700,000, and of the "Crown Point" in the South Belt, for nearly \$300,000. "Sunset No. 2" has passed into strong hands, and the "Colonna," "Monte Cristo" and "Virginia," are owned and being worked by another strong company, able and willing to thoroughly prospect this ground by very extensive development work if needs be. More recently, the British American Corporation, Limited, representing strong English capital, has acquired by purchase the "Josie," "Nickel Plate," "Great Western," "Poorman," "West Le Roi" and "Josie No. 1," "Columbia and Kootenay," and other claims in the very heart of the camp, upon which vigorous work will be at once begun and carried on extensively. Another English Company, represented by Sir Charles Tupper, has secured the "Velvet" and other claims on Sophia Mountain, where a new and important area is being carefully tested, about five miles west of Rossland.

Work is progressing on the "Deer Park," "Iron Colt," "Lily May," "Jumbo," "Cliff," "Abe Lincoln," "Coxey," but all work has ceased on the "City of Spokane," "Iron Horse," "C. and C," "Georgia," "Evening Star," "St. Elmo," "San Joaquin," "Palo Alto," "Nest Egg," "Mayflower," "California," "White Bear," "St. Paul," "Commander," and other properties, for the working of which much more capital is now required. If the arrangements are concluded satisfactorily with English investors, work will be soon resumed upon the "Homestake," "Gopher," "R. E. Lee," and "Maid of Erin" properties, with a good supply of capital. Of course it is needless to say that besides the above properties, a large amount of work is being done on the "Le Roi," "War Eagle," "Centre Star" and "Iron Mask."

It is now superfluous to state that it is useless to attempt mining in this camp with limited means, as the costs of mining are high, and calculations as to the amount of work necessary may prove altogether too low, and work have to cease by funds being exhausted, just when the prospecting should be pushed for all it is worth.

**Condition of Mining.** Except for the work done on eight or ten claims the amount of development has been to the present too small to demonstrate much, consisting, as it has, of short tunnels or drifts and shallow shafts, but where more generous development has been done, the results so far have been most encouraging, new ore bodies have been uncovered, or ore bodies hitherto carrying little or no values are found to be increasing in value. More pay ore is now in sight than at any other time in the Camp's history, and the writer still holds to his belief that "it is quite impossible that the large shutes of rich ore that have been shown on the surface by denudation, will be found to be the only ones."

As to the vexed question of Rossland ore increasing in value as greater depth is attained, the tables above will answer in part and in the negative, that is, the shutes of pay ore that have been mined from near the surface downward, are not showing higher values in depth, but are maintaining well the gold values, but it must be remembered that ore that could not be worked two years ago is now being treated at a profit, with the inevitable result that as lower grade ore is shipped, the tonnage greatly increases, but the average values decrease. On the other hand, if in sinking a new ore-shute is reached, it is only natural and

consistent to expect that the low values first found in the out-lying portions, or the fringes, of these replacement ore-bodies, should increase as the heart of the ore-shute is entered, and in such instances as this values do increase with depth. In these ore-deposits formed by replacement and impregnation of the country rock by mineralized waters passing up and along relatively small channels, it is proper to suppose that the richest ore, in most cases, will be found at or near this channel, while the most distant ore will be of decreasing value directly proportionate to this distance. That this is so, is very evident in the "Le Roi," where the core or the heart of the ore-shute is found to be of the richest grade, a number of shipments of 30 to 90 tons each, during the past year, 1897, running from 2.6 to 4.5 ounces of gold, 2 to 4 ounces in silver per ton, and 5 to 7 % copper.

Up to the present, development work to any extent, such as entitles a property to be called a "mine," has been limited to only a few claims, but with the advent of the strong companies above mentioned, and the endeavours of the less strong but progressive operators, present conditions indicate a healthier and more substantial stage of affairs in Rossland, where more thorough work is being done, more men are being employed, and a campaign of development is now inaugurated, that aided by better and cheaper facilities for transport and treatment, should decisively determine whether or not other bodies of gold ore here exist.

The condition of the already established mines, such as the "Le Roi," "War Eagle," and "Centre Star," is excellent, they have never looked as well as now, and faith in this unique gold camp is strong in those best acquainted with all the details. By reason of its gold that is now so attractive, or fashionable, to foreign investors, Trail Creek is a most important district, and for some years at least the prosperity of the mining industry of the Province will be greatly influenced by the prosperity here, at least as far as investors are concerned.

Since last report the ore body in the "Le Roi" has been found to **Ore bodies.** maintain its fine dimensions to the present depth of nearly 700 feet, and in July, at time of visit, in the bottom of the shaft, then at the 600-foot mark, were 7 feet of solid, high grade, or first-class ore, apart from 16 feet of lower grade ore since exposed by cross-cutting. On the 500-foot level was seen a shute of good ore, 6 to 14 feet wide, then extending for over 400 feet in length without reaching the limits of the shute. What at the time of former visit appeared as two faults crossing the ore-body, about 175 feet apart, have since been shown to be two cross-courses or dykes of rock very similar in appearance to the adjacent country rock, which have apparently faulted the ore-body very slightly, or for a few inches only. In the roof of the lower stopes could be beautifully seen the band of laminated calcite from a few inches to 2 or 3 feet wide, running longitudinally through the heart of the ore-body, as was spoken of as also existing in the upper workings, and of course abruptly crossed by the dykes.

In the "Centre Star" a very large amount of low grade ore now stands exposed, among which is good shipping ore, of which several shipments have been made by Mr. Durant during the year, the first from this mine. In the "War Eagle," very little ore was left in sight when the mine passed into the hands of the present company, but since then, Mr. Hastings has uncovered a large amount of good ore, both in the upper and in the lowest workings, and this property is being most systematically explored, a large amount of ore is being blocked out, but left standing awaiting cheaper freight and smelting charges. The "Iron Mask" has shipped considerable during the year, but shipments have been deferred by reason of the lawsuit now pending with the adjacent "Centre Star," over extra-lateral rights. Early in the year the "Josie" opened up an ore-shute near the "Poorman" line, but work is now being confined mostly to the drifts from the shaft.

On the "Monte Cristo," where was found near the surface such a body of valueless pyrrhotite, in the lower tunnel and incline from same, or to a depth of nearly 500 feet from the surface, has been found ore carrying much more copper and enough gold that should make this, if correctly reported by the management, good pay-ore, but extensive exploratory work is being pushed ahead vigorously. On the "Evening Star" more good ore has been found, but there has not been sufficient capital forthcoming to prospect this claim in a bold and thorough manner. Very little or no work has been done on the Monte Cristo Mountain during the past year, nor on Red Mountain, except on the "Rossland Red Mountain," "Cliff," "Monita," "Coxey," where as yet no pay-ore bodies are yet reported.

In the "Kootenay-Columbia" has been exposed a large amount of low grade, barely profitable pyrrhotite, which has also been struck in the adjoining "Iron Colt" claim, where much more work will be done to discover if higher values can be found in these shutes. On

the "Sunset No. 2" ore has been found carrying good values in three places, and the large body of, as yet, too low grade pyrrhotite is being further explored on the "Deer Park," where work had been suspended for some time. The body of ore found near the surface on the "Crown Point" has not yet been found in the lower workings. On Sophia Mountain (not inspected) it is said that fine bodies of rich copper ore carrying both gold and silver are being now opened up by Capt. Morish, and this will be of great importance if a large mine is here found, as it will mean the extending of this area as known to be mineral-bearing, and the results of this work will be watched closely. On the "Jumbo" work has been continued without ceasing, and much more low grade material is now in view.

The next two will be important years for Rossland, as the amount of exploratory work now promises to be much more extensive, and on several properties at least, known only as having most favourable surface showings, exhaustive. It is hardly to be expected that progress will be by leaps and bounds, but steadily progressive, and the prosperity of the town must be dependent, as every other mining town, upon the amount of production and pay-roll, as the hurrah of the speculator must inevitably give way to the more permanent and definite work of the miner.

### Ore Treatment.

*Smelting*—Since Bulletin No. 2 was written, several important alterations in plant and method have been made at the Trail Smelter, by which it has been made possible to smelt these ores under existing advantages or disadvantages after the best manner. The roasting of the ore is being done in heaps 16 feet deep, of 200 to 300 tons each, with more satisfactory results, as the slow, gradual roast in the heap appears to be much more thorough and effectual than in the mechanical calciners, where the particles of ore or pyrrhotite seemed to be case-hardened, as it were, thus preventing the burning of the inner kernel of the sulphides. Large blast furnaces are now used, and the matte is being refined so as to yield gold bullion.

In respect to smelting charges, there has been little or no reduction, the average price being \$11 per ton for freight and treatment. The Le Roi Company recently completed its contract of 75,000 tons for Mr. Heinze's smelter, and during the past year has erected a smelter at Northport, on the American side, whither ore is being now regularly shipped direct from the mine tramway over the Red Mountain Railroad. While Mr. Breen is general manager, Mr. H. C. Bellinger has resigned his superintendency at Trail to assume that office at the Le Roi smelter, where he will be at home with the best methods of handling this and other Rossland ores, as this smelter will do custom work. It is much to be regretted that this plant has left Canada, but the Le Roi people, feeling that money could be thus saved, have been constrained to build there, as the most strategic point available, although with further railroad facilities, as will be afforded when the C. P. R. builds from Rossland to Robson, on the Columbia, where cheap coke and coal will be landed from the Crow's Nest Pass, conditions, having a very material effect on this camp, will be considerably altered, and had this road come sooner this smelter might have been saved to the Province.

Awaiting other railroad building and cheaper fuel, and anticipating lower treatment charges, the "War Eagle" mine has ceased shipping from the large reserves now blocked out, except the ore taken out in development. The "Centre Star" and "Iron Mask" have been making shipments, and small lots have been sent from some other properties. So far Rossland itself has not been considered suitable as a smelter site, by reason of the facts that the water supply is very limited, and that fuel, fluxes and other ores would have to stand the heavy up-hill haul, and it has been estimated to be cheaper to take the ore down grade to a point where all the smelting essentials can be most advantageously assembled.

That smelting charges will be somewhat reduced before long it is not doubted. Mr. R. R. Hedley, in a paper on the "Possibilities for Smelting in B. C.," recently read before the B. C. Mining Society in Vancouver, stated that with a large plant, cheap fuel and minimum freight rate "the Rossland ore might yet be smelted for \$7 per ton f. o. b. at a profit to the smelter." Under such conditions then, with the cost of mining reduced to the lowest notch, large bodies of \$12 ore *may* yet be mined and smelted at a profit, but at present a very small margin, if any, of profit remains on \$16 ore, and then only in the case of large ore-shutes, where mining can be done at the minimum cost.

The very low percentage of copper in these ores, coupled with the fact that copper ores are so far not to be obtained for intermixing, at once makes the problem of smelting more difficult, but the last has not been said or done concerning the smelting possibilities at Rossland.

**NOTE.**—As this report goes to press, it is reported that the Canadian Pacific Railway Company has purchased Mr. Heinze's smelter at Trail and the narrow gauge railroad to Rossland, and that much lower rates for freight and treatment are to be offered.



**Wet Processes.** In assaying these ores fine metallic gold is almost always found on the sieves, so that the smelters have to specially determine this metallic gold in nearly every smelter pulp. The low grade ores offer big scope to the metallurgist, and while a good many laboratory tests have been made, yet it remains to be proven whether much of this ore is amenable, profitably, to one or more of the wet processes.

In the January number of the B. C. Mining Record Mr. Pellew-Harvey, F.C.S., states in "Notes on the Cyanide Process":—"I have made a good many experiments with these sulphide (*i. e.*, Trail Creek) ores (those with under two per cent. copper, about five pennyweights gold per ton, and one to two ounces of silver), and I have found that with a thirty-mesh screen and ninety hours' treatment and cyanide consumption of three pounds, that eighty to eighty-five per cent. of gold values, and sixty per cent. of the silver, are recovered. By fine crushing and removal of slimes, by amalgamation and cyanidation, I have recovered as much as ninety per cent. of the gold."

*The British Columbia Bullion Extraction Co., London.* Mr. L. H. Webber is now erecting for this company a 50-ton mill on the line of the Red Mountain Railroad, 2.5 miles west of Rossland. This process of extraction is by an electro-chemical method, and for over a year tests have been made with very favourable results in Denver, Colorado, on large lots of low grade Rossland ore. A water-power of about 100 h. p. will be available for about eight months from two sources, and at the present time a dam and 4,000 feet of fluming have been put in to bring the water from one creek. In the mill will be sampling machinery consisting of a rock crusher and rolls, and some form of automatic sampler, 150-ton storage bins under a switch from the railroad; in the mill some form of pulverizing machinery, yet to be chosen, vats, tanks, etc. The boarding and bunk houses are now built, the timbers for the bins and mill are framed, electrical power may be purchased, and work is expected to begin May 15th on the low grade ore now thrown on the mine dumps as waste. The purpose of this company is to buy the low grade ore on the dumps, paying cash for ore running \$6 to \$15 per ton in gold and silver according to a sliding scale proportional to values contained.

The operation of this mill, which can easily be enlarged, may prove of great importance to the camp in determining a course of profitable treatment for the large bodies of low-grade gold ore which, in all likelihood, can never be treated except by some wet process, and its progress and results will be awaited with great interest and concern.

**Railroads.** Since last report the Columbia and Kootenay Railroad has been extended as a broad gauge to Robson, where daily connection is made with the steamers to and from Arrowhead, and the trains of Nelson and Slocan City. The Red Mountain Railroad has been completed from Northport to Rossland, crossing the Columbia River by a steel bridge.

From Robson a line has been surveyed by the C. & K. west into Grand Forks and Boundary Country, and the C.P.R. corps are surveying a line to Rossland, the construction of which they have promised to complete at an early date.

**Geology.** During the summer of 1896 Mr. R. G. McConnell, of the Dominion Geological Survey, made a survey of the Rossland District, and an important account was given in the "Summary Report for 1896" which is now appended. During the past year a valuable reconnaissance geological map was issued by the Department of the Geological Survey.

#### "CHARACTER OF THE COUNTRY."

"The region examined forms part of the southern continuation of the Selkirk Range, and is everywhere of a rugged and mountainous character. It is traversed by several large and deep valleys running in different directions, the principal ones being those of the Columbia, the Kootanie, the Slocan, the Beaver and the Salmon. Draining into these are numberless small streams, usually of no great length, which take their rise among the higher peaks and summits and descend through deep wooded valleys to the main rivers. The present rough condition of the country is mainly due to the slow but persistent wearing action of these streams, or their predecessors on rocks of different hardness, the process having continued long enough to entirely obliterate all traces of the earlier configuration.

"The most prominent range south of the Kootanie is the group, called on some of the maps the Beaver Mountains, situated in the granite belt west of the North Fork of the Salmon. The higher peaks of this range approach an altitude of 8,000 feet. A number of peaks of

scarcely inferior height also occur south of the head of Hall Creek. South of the Beaver Mountains the country declines 1,000 feet or more in general elevation, and the contours of the hills and ridges become more uniform and rounded. Portions of the interior of this district bear strong resemblances to a boldly rolling plateau. West of the Columbia River an apparently endless succession of deep branching valleys and lofty ridges crowned at intervals with sharp peaks and crests are everywhere met with.

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#### "PREVALENCE OF IGNEOUS ROCKS.

"The most noticeable feature in the geology of the district examined is the marked predominance of rocks of igneous origin. Two great series are represented, of which the older consists mostly of porphyrites, diabases, gabbros, tuffs and agglomerates, and the younger granites.

#### "GRANITES.

"The granites belong to the same mass so largely developed in the country north of Kootanie Arm, and outlined in my summary of last year. The normal type is a medium-grained, grayish rock, consisting mostly of biotite, hornblende, quartz, orthoclase, and plagioclase, but great varieties in both texture and composition are frequent. In places, and over considerable area, the development of large feldspar crystals give it a distinct porphyritic appearance. When crushed, this form results in a typical augen-gneiss. With variations in the proportion of its constituents, the granite passes into hornblende-granite, granodiorite, and mica-syenite. The latter, cut by dykes from the acidic varieties, occurs largely along the Kootanie River west of Nelson.

#### "DISTRIBUTION OF GRANITES.

"The granites, except for some small inliers of schists, are found in their various phases all along the Kootanie River, and down the Columbia to near the mouth of Bear Creek. The south-eastern edge of the area crosses the Columbia River below the mouth of Bear Creek, and continues south for some distance along Lookout Mountain Ridge. West of the Columbia River from Lookout Mountain north to China Creek, the granites occur in a band from one to two miles in width, following the river and sending out occasional spurs to the west, one of which partly encircles the Kootenay-Columbia and Monte Cristo mountains, but north of China Creek it spreads westwards beyond the edge of the district treated of. East of the Columbia River, the granites extend, in an irregular-shaped mass from three to ten miles in width, north-eastward to Hall Creek. Besides the main granite area, numerous bosses and reefs of granite, evidently of the same age, break through the older rock throughout the district. The largest of these crosses the Nelson and Fort Shepherd Railway near Salmon Siding, and extends eastward into the still unknown country between the Salmon and Kootenay Rivers.

"The rocks on the Columbia River, for some miles above and below the mouth of Champion Creek, have some resemblance to parts of the Shuswap series. They consist of mica-schists and gneisses, evidently derived from granites interbanded with pegmatite, and the ordinary gray granite of the district in a more or less schistose condition. Somewhat similar rocks were also found on the Slocan River, near the 15-Mile House, but the presence there of some bands of lustrous mica-schists, typical of the Shuswaps, led me to infer them to that series.

#### "PORPHYRITES AND ASSOCIATED ROCKS.

"The older system of predominantly porphyritic rocks through which the gray granite breaks, occurs under so many forms and in such different degrees of preservation that it is highly probable rocks of different ages are represented in it. The prevalent rock of the series is a greenish augite-porphyrityte often passing into a porphyrite. The ground mass of this rock is usually diabasic, and in many places the augite phenocrysts of the porphyrite disappear, and it passes into a fine-grained diabase. The porphyrites, while often massive and uniform in texture and appearance, usually show a more or less brecciated structure on weathered surfaces. The embedded fragments and the groundmass, except for slight differences in colouration appear, microscopically, almost identical. Besides the augite-porphyritytes and diabases, massive eruptive rocks are also represented by gabbros, small areas of which occur at

Rossland and on the North Fork of the Salmon, and by the grayish porphyrites with plagioclase phenocrysts of Toad Mountain and Spokane Mountain. Fragmental volcanic rocks consisting of tuffs and agglomerates occur on Granite, Spokane and Sophia Mountains, and also on the ridges south of Lake and Bald Mountains, and in other places in the district. The agglomerates are calcareous in places, and are interbedded occasionally with bands of fossiliferous limestones. The fossils collected are imperfectly preserved, but are probably Carboniferous in age.

#### "SLATES.

"The eruptive series of rocks inclose bands and patches of dark fissile slates, which appear in most cases to be residual portions of the formations amid which the igneous rocks were erupted, as none of the bands, even where a thousand feet or more in thickness, can be traced for any distance along the strike. Slates holding small limestone bands occur on Hall Creek, on the North Fork of the Salmon, on Trail Creek, and in other places.

#### "DYKES.

"The granites and other rocks of the district are cut by numerous dykes and bosses, mostly belonging to about the same period, but showing extreme variations in texture and composition, specimens showing a range from light coloured acidic rock to a dark basic one, and from a microcrystalline, to a coarse granitic condition.

"The distribution of the various members of the eruptive series is extremely irregular, and owing to the large proportion of the surface concealed by drift and forests, and the limited time at our disposal, it was found impossible in many cases to trace out junctions except in an approximate manner. A brief statement of the distribution and character of this group so far as known, will, however, be given here; being of great economic interest, inasmuch as it contains the gold-bearing pyrrhotite ores which have made the district famous. The principal rocks of the series are now being examined microscopically by Mr. Ferrier, and some of the names given here may be altered when his investigation is completed.

#### "DISTRIBUTION OF GABBROS.

"At Rossland, the central member of the group is a fine to coarse-grained *gabbro*, apparently passing in a couple of places into a uralitic granite. The gabbros occupy an irregular-shaped area, with a length of about four miles and an average width of one mile. They extend from Deer Park Mountain eastward to the western base of Lookout Mountain. The line of junction between the gabbros and the bordering porphyrites, commencing at the north-west corner of the area, runs south through the Cliff, War Eagle and Le Roi claims; then turning to the west, circles round the spur from the main area which covers part of the Deer Park Mountain and continues eastward in a sinuous line, passing about a quarter of a mile north of the Crown Point mine to the foot of the west slope of Lookout Mountain. The northern edge of the area runs from the Cliff mine eastward to Monte Cristo Mountain, then bends more to the south, and skirting the southern base of the Kootenay-Columbia Mountain, continues in a south-easterly direction towards Lookout Mountain. The eastern edge of the area has not been precisely defined, owing to the absence of sufficient exposures. The gabbros are fringed with a varying width of augite-and-uralite porphyrites and fine grained green diabases. The passage from the porphyrite to the gabbros is nowhere sharply defined, and the two rocks have apparently originated from the same magma, but have cooled under different conditions. The gabbros and bordering porphyrites are important from an economic standpoint, as most of the ore-bodies at present being worked are situated either on or close to their line of junction.

#### "MASSIVE AND FRAGMENTAL IGNEOUS ROCKS SURROUNDING GABBROS.

"In passing outward from the gabbro area, a section taken at almost any point, shows a bordering zone of brecciated porphyrites and diabases of varying width, but seldom exceeding a mile beyond which comes an alternating series of porphyrites, tuffs and slates, and still farther away agglomerates, associated in places with fossiliferous limestone, make their appearance. Slates and tuffs occur with the porphyrites on Red Mountain, on Kootenay-Columbia Mountain and south of the gabbro area on Lake and Bald Mountains, and the ridges running south from them. Agglomerates make up the main mass on Sophia Mountain and occur with slates, tuffs and porphyrites on Granite, Spokane and Grouse and Lookout Mountains, and on the ridges immediately east of Sheep Creek.

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#### "VOLCANIC ORIGIN OF ROCKS.

"The roughly concentric arrangement of the Trail Creek rocks, and the gradual passage outward from a holocrystalline central area through semi-crystalline rocks to bedded volcanic fragmentals, suggest an ancient (although now deeply eroded) volcanic centre, situated near the site of the present town of Rossland, from which lavas and ashes deluged the surrounding district. The presence of small bands of coral-bearing limestone with the agglomerates and tuffs, also makes it probable that a shallow sea existed at the time of the out-burst, and that the eruptions were intermittent and continued during a lengthened period.

#### "SERPENTINES.

"The porphyrites on Spokane and O. K. Mountain, and on Lake Mountain are much fresher looking than those on Red Mountain, and may belong to a more recent period. An area of partly and wholly serpentized rocks occurs on Sheep Creek, between the western base of Deer Park Mountain and O. K. Mountain.

"From Rossland, porphyrites and associated rocks, often crushed into a schistose condition and accompanied by bands of argillites, were traced northward across Rock and Murphy Creeks to China Creek, where they are cut off by the gray granites.

#### "DISTRIBUTION OF PORPHYRITES AND ASSOCIATED ROCKS.

"West of the Columbia River, porphyrites and other igneous rocks similar to those at Rossland have a wide distribution. They are found along the Columbia River from the boundary north to near the mouth of Beaver Creek, where they are replaced by granites, and thence were followed in a north-easterly direction along the line of the Nelson and Fort Sheppard Railway to within a couple of miles of the Kootenay River. The width of the band was not ascertained, as the country east of the Nelson and Fort Sheppard Railway was not examined, except at a couple of points. From the railway, west to the granite area, a variable distance, dependant on the sinuosities of the latter, the country is altogether occupied by these rocks. They were found at the head of Beaver Creek and Champion Creek, and along the lower part of the North Fork of the Salmon. Near the mouth of the latter stream is a small area of gabbro, indistinguishable in appearance from that at Rossland, while farther up augite-porphyrates, of the ordinary type, accompanied by diabases and slates, make their appearance. The series here, as over most of the district, is traversed in all directions by porphyrites and other dykes of a later age.

#### "DISTRIBUTION OF ORE BODIES.

"The auriferous iron and copper sulphide ores at Trail Creek occur almost exclusively in the massive members of the eruptive series, and most of the important ore bodies which have so far proved productive are situated either on or close to the line of contact between the gabbros and surrounding porphyrites and diabases. The Le Roi, War Eagle, Cliff and a number of other leads west of Centre Star Gulch cut through the line of junction almost at right angles, while the Josie is situated a short distance to the left of it, in the porphyrites, and the Centre Star workings almost immediately east of it, in the gabbros. The Monto Cristo and Deer Park claims occur close to the same line, the Kootenay-Columbia a few hundred feet to the north of it, in a band of porphyrites, and the Crown Point, Homestake, Gopher and other leads in the south belt, a short distance to the south of it, in diabases and porphyrites. The ore bodies are, however, not altogether confined to the neighbourhood of the central gabbro area, but are also found in the bands of massive porphyrites which alternate with the surrounding volcanic fragmental rocks and argillites. The Jumbo is situated on one of these belts, as is also the Coxey, the Giant and a number of other claims. The tuffs, agglomerates and associated slates, with few exceptions, and those of little promise, do not carry the typical iron and copper sulphide ores characteristic of the Trail Creek region, but are traversed by occasional quartz veins which appear to belong to a later date.

#### "TRAIL CREEK ORE.

"The ores of the massive eruptive rocks, as stated above, consist principally of sulphides of various metals. Of these pyrrhotite or magnetic iron pyrites is by far the most abundant. This mineral constitutes the common Rossland ore, and also occurs in quantity, among other

places, on Bear Creek, Champion Creek, the North Fork of the Salmon, and at Waterloo. It is found, as a rule, in a massive condition, ranging in texture from a fine to medium grain, but it is also disseminated through the country rock.

The massive variety usually holds blebs of quartz and grains and irregular patches of other sulphides. The pyrrhotite contains gold and silver in varying quantities, a small percentage of nickel and traces of cobalt. A specimen from the Iron Colt, analysed in the laboratory of the Survey, gave 0.234 per cent. nickel, and one from the Monte Cristo 0.13 per cent. The gold contents are exceedingly irregular, ranging from traces up to several ounces to the ton, and the silver from traces to four or five ounces to the ton.

#### "CHALCOPYRITE.

"The pyrrhotite is usually accompanied by a certain amount of chalcopryrite or copper-pyrites, intimately commingled with it. The copper-pyrites is extremely irregular in its distribution in some places, constituting a considerable proportion of the ore-body, and in others occurring only as isolated and occasional grains and patches. It was nowhere seen pure in large masses. It is auriferous, and holds apparently about the same percentage of gold as the inclosing pyrrhotite.

#### "MISPICKEL.

"Mispickel or Sulph-arsenide of iron, is found associated with the pyrrhotite in a number of the mines, and in places occurs in considerable quantities. It is auriferous, and at the Evening Star mine, and possibly at other places, a portion of the iron is replaced by cobalt, and it passes into cobaltiferous mispickel or danite. Dr. Hoffman furnishes the following note on this mineral:—The specimen consists of a fine to coarse crystalline calcite, carrying a cobaltiferous mispickel—most probably the variety known as danite. It is coated in parts with ferric hydrate and peach-blossom red, hydrous cobalt arsenate (earthy cobalt bloom, a variety of erythrite), resulting from the decomposition of the mispickel. The mispickel may not improbably contain sufficient cobalt to be of economic importance, a point which will shortly be determined, the analysis of the mineral having been entered upon.

#### "MOLYBDENITE.

"Molybdenite or sulphide of molybdenum, occurs at some of the mines, notably at the Coxey and Deer Park. At the latter mine it is stated to be highly auriferous.

#### "OTHER MINERALS.

"Besides the above minerals, galena and blende occur at the Lily May and other locations in the south belt, and also at the Union and other mines to the north of the main mineral area, but are not found, so far as I am aware, in the principal Red Mountain mines. Ordinary iron-pyrites is met with in greater or less quantities nearly everywhere.

"The ores are usually oxidized on the surface, but the alteration seldom extends downward for more than a few feet, and in some cases a single shot brings the unchanged sulphides into view.

#### "CLASSIFICATION OF ORE-BODIES.

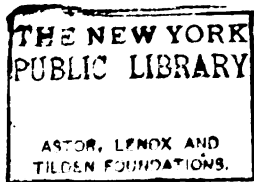
"The classification of the Trail Creek ore-bodies, and the sulphide deposits generally of the igneous rocks of the district is a difficult problem, and one which has given rise to considerable difference of opinion. They may be (1) original segregations from a cooling magma, like the Sudbury pyrrhotite ores, (2) secondary segregations from the basic rocks which inclose them, (3) replacement veins along the lines of fissuring, or, as the majority of the miners are inclined to believe, (4) true fissure veins. Isolated examples might be cited in support of any of these views, but taking the deposits as a whole, the theory which fits in best with the prevailing conditions is undoubtedly the third. The blunt irregular outlines of some of the ore-bodies, and their fissure-like regularity in others, the presence in most cases of a single wall which is often meaningless as a confining line and the occasional lack of any wall, the gradual blending of the ore from ascending heated waters, which have eaten away portions of the country rock along lines of fracturing, and replace it by the materials held in solution. The definite and approximately parallel direction, and dip of the majority of the Rossland leads, the silicious



ROSSLAND.



NELSON.



character of many of the ores and the presence of calcspar in seams and irregular pockets, tell against the theory of original segregation, which has of late years been applied to somewhat similar deposits in different parts of the world, while the ordinary ear-marks of fissure veins, as usually understood, are seldom observable.

#### "PERMANENCY OF ORE-BODIES.

"The miners of the district are generally prejudiced in favour of fissure veins, under the belief that they are the only ones which are apt to be continuous in depth. There is no reason however, why replacement veins following lines of fissuring, and filled with material derived from below, though subject to greater variation in volume, should not be equally permanent.

#### "AURIFEROUS QUARTZ VEINS.

"Besides the pyrrhotite and associated sulphide-ores characteristic of the basic volcanics, an important system of silicious ore-bearing fissure veins has a wide distribution in the district. The quartz leads are not confined to one formation, but occur indiscriminately in all. The O. K. occurs in an altered and partly serpentinized basic volcanic rock; the Fern in massive porphyrite; the Poorman, Maud S. and Clearwater, in granite; the Exchequer, in schistose eruptives; the Elsie, in granite. The quartz leads vary greatly in size, but seldom exceed six to eight in width, and usually average less. They contain free gold, auriferous pyrites, chalcoprite and galena. Stamp-mills have been erected at the Poorman and Fern, and a number of the other leads are being prospected."

### TROUT LAKE MINING DIVISION.

The Trout Lake Mining Division lying north of the Slocan and between the Ainsworth and Lardeau Divisions on the east and west respectively, embraces all that territory drained by the rivers and streams flowing into Trout Lake, into the Lardo River above Cascade Creek and into the Duncan River above the summits south of Hall and East Creeks, all the drainage of this area being by the Lardo and Duncan Rivers into the northern end of Kootenay Lake.

#### ROADS AND TRAILS.

The best means of approach now open is by the Government waggon road from Thompson's Landing at the upper end of the north-east Arm of Upper Arrow Lake, running north-easterly eleven miles, where one branch in one mile enters Trout Lake City on the upper end of Trout Lake at the mouth of Lardo Creek, while the other, in four miles, reaches the new town of Ferguson, now springing up on the large bench below the Forks or the confluence of the North and South branches of Lardo Creek. This would be a very good road but for three or four miles where it passes through very wet ground in the heavy timber, where a great improvement would be effected by slashing or cutting down the timber and corduroying the worst places, the large cedar here being especially suited to this purpose.

This road was being continued four miles by the Lillooet, Fraser River and Cariboo Gold Fields Co., up the creek from Ferguson to Eight-Mile, whence the trail will run up to the "Silver Cup" and "Sunshine" mines. A trail, seven miles long, runs from Trout Lake City to the "Great Northern" or "Alpha" group, while a new trail is being built from the Lillooet, Fraser River and Cariboo Gold Fields Co.'s camp, near Ferguson, to tap this trail three miles from this group, for the easier transport of supplies and ore.

From Ferguson, trails lead up the North Fork seven or eight miles to the "Commonwealth" group and other claims, while another runs from the end of the waggon road at Eight-Mile to Ten-Mile, or the junction of Gainer Creek with the South Fork, whence a trail branches up Gainer Creek to reach the "Molly Mack," "Silver Chief," "Black Prince," "Bad-shot" and other properties, and the main trail, but a very rough one, continues up the South Fork, crosses a summit down into Healy Creek, up which it passes to connect with the "Abbott," "Wagner" and other groups of claims on the divide west of the Duncan River, 20 to 25 miles by trail from Ferguson.

From Trout Lake City by row boats, trails running up some of the creeks on either side of the lake, are reached, and from the foot of the lake an incompletely cut out trail runs down



the Lardo River to Kootenay Lake. Trails also are cut out between Kootenay and Howser Lake, on which is a small steamer to accommodate the many prospectors now prospecting the upper tributaries of the Duncan, up which river they travel by boat, as the trail as yet is but poorly cleared.

Another road has been partially completed by the above-mentioned company from Rosenheim, on Upper Arrow Lake, through a comparatively low pass to connect with the road from Thompson's Landing to Trout Lake City. A small steamer may soon be placed on Trout Lake, which is eighteen miles long.

#### RAILROADS—PROJECTED OR POSSIBLE.

This district, while very mountainous, by reason of the deep valleys and low passes, will be comparatively easy to penetrate with railroads, such as by a line from Upper Arrow Lake *via* Trout Lake and Lardo River to Kootenay Lake whence, it is claimed, no serious difficulties are to be met with in ascending the valley of the Duncan River should developments warrant the construction of a line into this region.

Already a preliminary survey has been made from Arrow Lake to Trout Lake and thence up Lardo Creek to Gainer Creek, and charters are extant for roads up Duncan and Lardo Rivers.

#### TOPOGRAPHY.

This district is very mountainous, especially that part drained by the Duncan River, and the divided summits of highly-tilted sedimentary rocks tower from 7,000 to probably 11,000 feet in height, harbouring in the high basins and on the divides glaciers and perpetual snow, affording scenic effects of great grandeur and beauty probably unsurpassed anywhere in the Province. The mountain-sides are steep, leading down into deep, narrow valleys, which are heavily and densely timbered, more particularly in the Lardo basins, to an elevation of 5,000 to 5,500 feet above sea level, a condition that so far has compelled most prospecting to be done nearer the summits, where the rock is more exposed, with the result that the mining work now being done ranges in elevation from 5,000 to 8,000 feet, although now, guided by the known trend, some of the leads are being traced down to much lower elevations, where, in the valleys, they should be found as well and as strong, probably, as near the rock-bare summits.

The under-brush, up to an elevation of about 5,000 feet, is heavy, and little or no feed for horses can be found, except near and above timber line, where it is generally excellent. The country is drained by many creeks and strong streams, which will yet prove of great value for milling and power purposes, although in the autumn and winter months the amount of water must necessarily be of much less volume than during the rest of the year.

Altogether, the surmounting of the natural conditions that here obtain will be in nowise greater, in the writer's belief, than those that have been so splendidly overcome in the high mountains of the Slocan, where the apparently inaccessible mines are now being made easily accessible by railroads, roads, trails, and the far-spanning aerial tramways. If good mines of good grade ore are developed, the means for transporting ore to the markets will be supplied, but the mines must be first proved up before others can be expected to supply these means.

#### GEOLOGY.

Trending north-west and south-east, south-west of the Trout Lake and the Lardo River valley, is the area of schists, gneisses, and granites, now proving to be mineral-bearing; but to the north-east of this line is a large area of highly-stratified sedimentary rocks that, for a width of six to ten miles, comprises a great thickness of slates, shales, and calcareous schists, with thin beds of quartzite and limestone, trending also north-west and south-east, standing nearly vertical or dipping south-west up to the great belt of marbleized limestone, or "Lime Dyke," as it is locally called, to the north-east of which the dip of the formations is to the north-east.

This limestone formation (*see* Frontispiece), evidently both over and underlaid by slates, shales, etc., is evidently the apex of a very steep and sharp anticline, of which the sharp crags and peaks of limestone form such a marked feature for miles through this region, or else it has been elevated to its present position along a line of faulting, although at the head of Hall Creek, near the "Wagner" group of mines, the evidence of a steep anticline seemed conclusive,

and the dipping of the formations either way from this apex was most apparent. On the south-west side, the line between the lime and slates runs in a straight line for many miles, and along and near the line of contact on either side of this limestone, but more especially on the south-west side, prospectors are at work, although all veins, so far, with some exceptions, have been found in the slate and schist formations, not only near the lime belt but several miles away, as exemplified in the "Silver Cup," "Great Northern," and other groups, so that a wide extent of country here presents possibilities for the location of veins of pay ore, and already the discoveries so far made have not been localized but widely scattered.

The limestone that has attracted hither many prospectors and miners who have worked in the great silver mines in the Carboniferous limestones at Leadville and Aspen, Colorado, and know the great possibility for the deposition of rich ore-bodies in such a formation, is very solid and highly altered, and as yet known, not traversed and influenced by intrusions of igneous rock, of which very little seen in the sedimentary rocks of this district, and which, in some way was very potent in those parts of Colorado mentioned, in the forming of great ore-bodies. These veins, found in this belt, are thought to be the same as those that cross the slates, but as yet, so very little work has been done that little is known concerning the veins here found, and so far the slates and schists have proved to be the most important ore-bearing formations. Belts of these latter rocks are in parts well interlaminated with narrow bands of quartz, and also crossed in irregular forms by barren white quartz.

#### ORES AND ORE DEPOSITS.

The ore so far found in this district is essentially argentiferous galena, mixed with this galena is more or less tetrahedrite or grey copper, in direct proportions to the amount of which is the value in silver, and on some properties, as the "Silver Cup," etc., good gold values are also carried. More or less zinc blende is nearly always present and often copper and iron pyrites. However, some other variations are seen as on the "Sunshine" and "Great Northern" groups where galena and coarse cubed pyrites form much of the ore, while on the latter lead nearly solid copper pyrites is localised in small pay-streaks, and on the "Great Northern" and "True Fissure" the ore is mostly iron pyrites in quartz, carrying small values in silver, or 12 to 30 ounces, and \$1 to \$4 in gold. But so far the ore of the district as stated above, may be said to be essentially argentiferous galena, although large veins of slightly mineralized quartz have been staked off, but not exploited as yet, or tested for gold.

On the surface, many of the veins show a large development of white-weathering milky-white quartz, with in some leads siderite or spathic iron, and while much of this quartz may be barren, it is in other parts mineralized or speckled with pyrites and galena which is found often segregated into bands of solid ore, or else so disseminated through the quartz gangue as to form ore that must be concentrated, so that while clean ore can be hand-picked and thus shipped, concentration will be a necessary adjunct for many of the properties. On some claims the galena ore occurs in small veins up to 8 to 12 inches wide of solid material, but much more work is yet essential to demonstrate their persistency or continuance.

As to strike and dip, they nearly coincide with the strike and dip of the enclosing slates or schists, but on closer examination the veins are found to cut across the planes of stratification or with a dip of 45° to 80° from the horizontal.

#### TRANSPORTATION.

The transport charges to Arrow Lake are prohibitive, except for very high grade ores, but if sufficient amount of shipping ore is demonstrated to exist it will not be difficult to supply much better and cheaper facilities.

#### CLAIMS.

The various groups of claims now located are widely scattered, and this year further prospecting is adding to their number, especially on the ranges on either side of Trout Lake and up Canyon and Tenderfoot Creeks, the southern affluents of Lardo River, but although the early locations date back to 1891-92, there is yet a great lack of work which is so necessary for progress, and every effort should be made to develop as much as possible all claims showing veins or leads, for upon this work depends the opening up of this section of country, as men with capital are much more quickly attracted to properties on which work is done, and with the opening up of ore-bodies of pay ore the means of transport will be supplied when tonnage

is assured. The advance will be slow if development work is neglected, and will only be proportionate to the efforts made by the owners to prove that their claims promise to become mines.

This year there has not been made the advance predicted, due greatly to the cessation of nearly all work by the Fraser River, Lillooet and Cariboo Gold Fields Co., which proved to be a serious damper, together with the unfortunate fall in the price of silver.

The *Silver Cup*, *Sunshine* and *Towser*, located on the same lead at the head of Silver Cup Creek, south of the south fork of Lardo Creek, four miles by road and three by trail from Ferguson, elevation 58-6,600 feet, are owned by the Lillooet, Fraser River and Cariboo Gold Fields Co., Limited, or by a subsidiary company. This vein, or rather two parallel veins, about 50 to 60 feet apart, located near the timber-line, N. 50° W., and S. 50° E., and dip south-westerly at an angle of 70° to 80°, apparently coincident, but cutting across the stratification of the enclosing black or carbonaceous slates. On the surface the out-crop is meagre and insignificant on what is known as the "Silver Cup" vein, consisting mostly of very irregular quartz stringers and masses along the course of the vein, and running towards vein "No. 2" or "Free Coinage" vein, which out-crops in several places as a slightly mineralized milky-white quartz.

On the *Silver Cup*, a shaft was begun where the quartz was much mineralized, and sunk 183 feet along a smooth hanging wall, where it connects with a cross-cut tunnel 364 feet long. In sinking this shaft the vein is very persistent for over 100 feet, carrying in places sheets of clean ore 6 to 20 inches wide, and then nearly barren quartz 18 to 30 inches wide. At a depth of 20 feet, a drift 40 feet to the south-east follows the smooth hanging wall, next to which is lying 1½ to 2½ feet of white quartz, next to which is a streak 6 to 16 inches wide, of nearly solid high-grade ore, in which a small stope has been raised leaving ore in the bottom, but showing only mixed quartz and ore in the face of this short drift. Further down the shaft can be seen more clean ore, but practically little or no work has yet been done here, although probably 50 tons of high-grade ore have been here extracted, and at the top about 25 tons was being sorted and sacked, leaving a considerable proportion of concentrating material.

*Tunnel.*—At 295 feet the tunnel intersected the No. 2 vein where it was 5 to 6 feet wide, with a band of solid white quartz along a smooth foot-wall, and then several bands of nearly clean ore, one of which at the face of the drift, in about 15 feet, was 14 inches wide, but besides this clean ore was considerable very good concentrating ore, all of which was being piled outside on the ore-dump as broken down, from which pile clean ore was being hand-sorted. At the intersection with the shaft, that vein was there very narrow, although the intervening space between the two veins or about 60 feet, the slates were traversed by small stringers of quartz, and sometimes clean ore. But in reality the opening up of this property was just begun, and these drifts, two just about to be started, will give much more idea as to what are the possibilities of these two veins.

*Ore.*—The ore is very high-grade argentiferous galena, both fine and coarsely crystalline, carrying grey copper, zinc blende and copper and iron pyrites. Since the time of visit, work has progressed rapidly, and the ore-shute is said to be looking very well, and to be nearly continuous along the drifts. Shipments recently made carried the high average of 196.7 ozs. of silver, \$8.80 in gold per ton, and 34 % lead. Number of men employed, 35.

On this, the north-west extension of the above claim, a tunnel 340 feet lower in elevation than the "Silver Cup" tunnel, and about 1,000 feet further to the north-west, has been driven for 290 feet south-east, in which, for 50 or more feet, ore 6 to 16 inches wide has been followed in driving the tunnel through which, 15 to 20 tons of clean ore or galena with coarsely crystalline iron pyrites, had been extracted together with a considerable pile of concentrating ore. The new superintendent, Mr. D. G. McNeil, had suspended work on this tunnel.

On this claim, lying north-west of "Sunshine," a 40-foot tunnel had been driven, without success, to cut the vein, but it was believed that an out-crop of quartz found on the line of the vein was the vein itself, and work was being started to exploit this part of the vein by open cuts.

This claim, 1,500x1,500, owned by Thos. Dunn and Wm. Farrell, Vancouver, lying south-east and higher up the basin from the "Silver Cup," had a small shaft sunk 12 feet on a small vein of quartz slightly mineralized, thought to be the No. 2 vein in the "Silver Cup" tunnel, and to exploit this claim Mr. Munroe had begun a tunnel to run along this vein and then cross-cut in search of the "Silver Cup" vein.

In this locality the slates or shales below the surface are very black and carbonaceous, and are very evenly bedded, except along the course of the veins, where they are considerably twisted and contorted.

*Other Claims.* Many claims have been located in proximity to this group of claims, and also as extensions, but as far as could be ascertained very little or no work had been done.

**Alpha Group.** This group, otherwise known as the "Great Northern" group, lies at an elevation of 5,500 to 6,000 feet along the ridge of mountains between the Lardo Creek and the North Fork of this creek, or about three miles west of Ferguson, or eight miles north-west of the "Silver Cup." By road and trail it is seven miles from Trout Lake City, and by the new trail about five miles from Ferguson. Along the course of this lead have been located, among others, the *Butte, Phillipsburg, Old Sonoma, Broadview, Hillside* and *Great Northern, True Fissure, Silver Queen*, etc., and this lead is distinguished by its great width of milky-white quartz in which, as will be detailed, work is in progress in search of bodies of galena ore which is here not of so high grade in silver, or probably 30 to 40 ounces per ton.

The Lillooet, Fraser River and Cariboo Gold Fields Co., Limited, has secured the *Broadview, Old Sonoma, Phillipsburg*, the fractional claims the *Clipper, Skipper*, and *Skiff*, and the *Alpha, Confederation*, and *Colonial*, and on the *Broadview* was being, in July, concentrated all development, as here there runs throughout the claim, nearly conforming with the strike and dip of the enclosing slates and schistose sedimentary rocks, the great thickness of white-weathering quartz, for the most part only slightly mineralized. Where exposed by stripping, on the surface there are seen a main band of quartz, 30 to 40 feet wide, and then lesser bands of quartz with country rock between, and parts of the larger body of quartz contains considerable siderite, near which, in some of the workings, are found both solid and mixed ores, and in one of the tunnels a narrow band of siderite, galena, and blende had been followed. So far, the limited workings had not penetrated the vein beyond the point where surface agencies have been very potent, as the ground was very much shattered, the sulphides were much decomposed, and the work had not time to advance far enough to demonstrate the characteristics of this large quartz lead, or to show up the existence of ore other than that found in the upper workings.

*Ore.* In the shaft was found solid ore of coarse cubed galena, with considerable zinc blende and iron and copper pyrites; also, as well as in some of the other openings, a considerable amount of this mixed ore and quartz that might be suitable for concentration, while much honeycombed quartz, becoming, when undecomposed, quartz impregnated with very coarsely-crystalline iron pyrites, such material, it was claimed, carrying small gold values. Elsewhere, in some of the tunnels, were being found narrow stringers, 2 to 10 inches wide, of nearly solid copper pyrites, and also small stringers of solid iron pyrites assaying high in silver. Strike of vein, west of north, east of south; dip, 45 to 60 degrees easterly.

*Shaft* on summit; elevation, about 6,000 feet. Here the lead is 30 to 40 feet wide of quartz, carrying a good percentage of siderite and iron pyrites which, on decomposition, has become a very honeycombed sintery mass. A shute or band, 20 to 30 inches wide, of the solid galena-blende ore was here found, and a shaft was sunk for 25 to 30 feet along this ore when the quartz and pyrites came in, and continued to the bottom, 118 feet down, and also in a wide drift run along the vein for 50 feet at the 50-foot level. No further work is being done at this point, but, from the pile of ore extracted while sinking in this shute of galena ore, clean ore was being sorted and sacked for shipping.

*Tunnels.* (a.) *Fifty-foot level*, or 75 feet lower down the hillside than the collar of the shaft, and several hundred feet northerly, runs southerly 186 feet, passing for most of that distance schists and quartzose material, but encountering a narrow band of mixed galena ore, in which, at 135 feet, a winze has been sunk 25 feet, this ore being now piled in the tunnel, on which work has been stopped.

(b.) *Hundred-foot level*, 100 feet below tunnel (a), was originally run in 112 feet along very quartzose but barren slates and schists, and through much white valueless quartz; but Mr. McGuire, on assuming charge, discontinued this work, and, going about 100 feet easterly, stripped the surface, exposing a wide band of white quartz, then parallel bands 4 to 6 feet wide, with country rock intervening, and along near the foot-wall of this large band a tunnel was being driven, in 100 feet, July 24th, in badly crushed ground, having followed for some distance a stringer, 5 to 8 inches wide, of nearly pure copper pyrites.

(c.) *Two hundred-foot level* was just being started near the foot-wall side of a large exposure of barren white quartz.

(d.) *Three hundred-foot tunnel*, probably 1,000 feet north of the shaft and 400 feet lower in elevation. At the beginning of this work considerable mixed ore of low grade was found in the open cut; then the tunnel was run 60 feet south-east in white quartz and spathic iron, but with no ore, so Mr. McGuire came back to near the entrance, and is running south 15° east, 85 feet, July 24th, along a smooth wall in white quartz following a small leader of ore.

Hence not much or no pay ore has yet been discovered on this claim, as the silver values are too low, and while development work had only begun there were all the evidences of a very strong lead, of which the ore-bearing possibilities might prove good, but all work was stopped last summer and nothing further is being done on these claims.

*Transport.* By the new trail 200 tons were to have been hauled out to the company's depôt on the main waggon road near Ferguson, and thence shipped by waggon to the steamer landing at Thompson's Landing. If the property were developed, and a sufficient amount of concentrating ore found, an aerial tramway might be run down to the mill-site on Lardo Creek above the depôt, near which passes the surveyed line of the proposed railroad from Arrow Lake.

At the depôt large and commodious log cabins, stables, etc., had been erected from which supplies could be sent to the properties here under control of the management. At the mine sufficient cabins have also been erected. In Lardo Creek is an ample supply of water under a good head for milling purposes.

Lies immediately on the southern extension of the above claim, and in  
**Old Sonoma.** a small shaft 25 feet deep with a 50-foot drift is seen a small amount of quartz carrying a little galena and iron pyrites, while a tunnel has been driven 203 feet, but with the disclosure of no ore. No ore yet found on the *Phillipsburg*.

These claims lying between the "Broadview" and "True Fissure," D.  
**Great Northern.** McPherson, Trout Lake City, have the surface well covered with wash or detrital matter, but four cross-cut tunnels, now badly caved in, have been run in towards this large quartz ledge, at the lower one of which the dump consisted of black carbonaceous slates and white quartz with traces of galena, while from an upper tunnel a large amount of quartz and iron pyrites had been extracted, from which 17 tons were sorted and sent to the smelter in 1896, the returns for which are not known.

In another tunnel a little higher up is an exposure of quartz with a large amount of iron pyrites carrying also galena and zinc blende. No work was being done at time of visit, and the condition of the tunnels precluded any proper underground examination.

On this claim, for a wide area, the slates and shales have been eroded  
**True Fissure.** leaving a large exposure of the white quartz that must be from 20 to 40 feet thick along the steep hillside.

In one shallow cut was seen considerable siderite with a little galena, and below this a cross-cut tunnel has been driven 94 feet in which about 20 feet of solid white quartz, carrying fragments of slate, some iron pyrites and very little galena, were first cut, beyond which the tunnel ran through crushed and contorted black slaty material crossed and seamed by stringers and masses of barren white quartz along which a drift is in 22 feet. From the quartz-lead assays of \$8 to \$22 in silver were obtained by Mr. McGuire. Farther to the north the surface dirt has been cleared off this large exposure of quartz, and a short tunnel of ten feet driven in, and here, on the upper or surface part of the ledge, can be seen much nearly solid iron pyrites 1½ to 2½ feet thick, under which lies a narrow parallel band of fine galena scattered through the quartz, below which again are 3 to 5 feet of siderite and quartz with irregular masses or blotches of iron pyrites, underlying which, is the barren white quartz with fragments of country rock, the dip of these bands, i.e., of the ledge, being 45° easterly. From a pile of nearly pure pyritous ore, here fair assays in gold and silver are reported. While a large amount of this quartz ledge matter is thus exposed on this property, the very little work yet done has not exposed any body of pay ore nor concentrating ore, although from material taken at the north end of the claim assays of \$4 in gold and 10 ozs. silver per ton have been got by assaying. All work has been suspended here.

**Silver Queen.** This claim, north of the "True Fissure," has had some work done on the continuation of this lead.

These claims, the *Glenside*, *Vera* and *Tom Thumb*, are on the North  
**Common-wealth Group.** Fork of the Lardo, but were not visited. However, a Brandon company were developing this property on which was said were two, perhaps more, veins of quartz and galena that might prove to carry concentrating ore.

The *Horne* lead was not visited, as nothing was being done except some assessment work on the claims located for miles along the supposed trend of a large lead of quartz and galena with low silver values, which is said to run in parallel stringers on the North Fork of the Lardo Creek.

*Blackburn*, 2,500 feet south of the above lead, is very little developed. Some low grade galena showing.

*Glengarry*, on Silver Tip Creek, a tributary of the Duncan, and on the divide between this and Boyd Creek. The trail runs up Fish Creek to the claim located high up among the glaciers, and although very little work has been done, there is said to be a wide six-foot quartz lead carrying some galena, although in one place a foot wide of clean ore is showing.

#### GAINER CREEK.

Circumstances were such that this creek was not examined, although two attempts were made and time was limited.

Elevation about 7,500 feet, 5 or 6 miles up Gainer Creek. F. Campbell and F. Johnson own this claim, and the adjoining *Pine Tree*, and three other claims. This property is located along the contact of the up-tilted schists and the "lime-dyke" or limestone belt, and in the limestone is a small vein of argentiferous galena, on which several assessments have been done.

*Other claims* near here are located on small galena stringers.

*Black Prince*, owned by Mr. Yawkee, *et al*, lies along this same line of contact, south-east of the "Badshot," but on the opposite or east side of Gainer Creek. It was stated that a 150-foot cross-cut tunnel had been driven to intercept a small vein of galena in the limestone, occurring more as small stringers. Located high up and accessible only by a very steep trail. No work being done.

*Pathfinder Group*, lying S.W. of "Black Prince" group, and owned by McCollough and Brewster. In the slaty formation, not far distant from a porphyry dyke, are found stringers of quartz, and galena said to carry very good silver values. A cross-cut was being run along one of these stringers towards this zone.

*Molly Mack*, three miles up Gainer Creek. Some work was being done to prospect some ground where some quartz, iron pyrites and a little galena were showing.

*Silver Chief*, 4.5 miles up Gainer Creek, near summit on the east side. Mr. Hugh Stewart was said to have 9 men at work developing two small 8 to 10 inches of steel galena.

#### HOTEL AT 10-MILE.

A small hotel was opened at the confluence of the Lardo and Gainer Creeks, which made a convenient stopping place *en route* up Gainer Creek or to Wagner Group.

This group, or the highest mine in the Province, elevation 8,200 feet, lies on the summit between Cariboo and Hall Creeks, and thence extends south-east down the gully below the glaciers, across the head of Hall Creek Gulch to the summit separating this gulch from that one occupied by the Abbott group and drained by a stream into Healy Creek, Hall and Cariboo Creeks, flowing into Duncan Lake, or in the other direction.

The Selkirks here are very grand—the lofty, craggy peaks towering above gigantic glaciers, while the steep mountain sides are scoured in places by avalanches or snow-slides, yet near these summits have been made discoveries of silver-galena deposits, especially near or at the line of contact of schists and slates, with the great tip-tilted band of marbleized limestone or "Lime Dyke," that stands up prominently for many miles with towering, precipitous, naked sides and castellated crests.

The claims, the *Lardo*, *Duncan* and *Elia*, each 1,500 by 1,500 feet, are owned by Messrs. W. G. Johnson, W. S. Rugh, C. T. Porter, *et al*.

On the *Duncan* claim on the top of the ridge, at an elevation of over 8,000 feet, a small knob or boss of slate or schists, rises from the perpetual snow and ice. A zig-zag trail leads from the tents (elevation 6,500 feet) up to these glaciers, and then across this solid mass to the tunnel, which here enters and passes along a smooth wall of white quartz of a large and strong ledge, the out-crop of which runs up and over this knoll.

This out-crop consists of a wide mineralized zone of bands of quartz, galena and irregular bands of slate nearly coincident in strike and dip with that of the country rock. Strike, north 50° west; dip, south 40° west 70°.

There is much barren quartz, but there is also much carrying a good percentage of galena with good silver values that, under the proper circumstances, may prove good concentrating ore. This zone is 30 to 40 feet wide of mixed rock matter and ore with bands of clean galena 3 inches to 2 or 3 feet wide.

The tunnel follows along a smooth quartz wall with a nearly continuous streak, 2 to 20 inches wide, of clean, fine-grained galena shows in the roof, 100 feet to the face, and two cross-cuts to the left, 8 feet long, are still in quartz carrying a very good percentage of galena, a little iron pyrites and zinc blende and tetrahedrite, hence the width of this ore-body in the tunnel was not disclosed. Since time of visit a winze has been sunk 80 feet showing, it is stated, about the same conditions.

The method of working this property and the transport of the ore down to a concentrator will present some unique features, as the workings and aerial tramway would have to be located so as to be safe from snowslides, but much more work is necessary before such are considered, to determine the extent and value of this interesting vein.

This ore will, in every probability, have to be exported *via* Hall Creek and the Duncan River, as the trail from Ferguson, about 24 miles long, is a hard one and climbs over two divides. There is little or no timber upon these mountains except down in the valleys, and fires have burned over a lot of ground.

The owners think there are indications of this ledge below the lower limits of the glaciers, but no tests have been made to verify.

This claim and the *Queen Mary*, *Princess Marie* and *Lucille K.*, owned Francis Jewell, by C. T. Porter, W. S. Rugh, *et al*, lie as the north-east extension of the "Wagner" group, and in a 30-foot tunnel on this claim has been found a vein of quartz, galena (silver-bearing) and grey copper. In the gulch just below the "Wagner" claims, and on the *Queen May* and *Princess Marie*, extends for about 500 feet, a strong vein of banded, coarsely crystalline quartz, 10 to 15 feet wide, very slightly mineralized with pyrites and galena. Practically no work has been done on this exposure, nor have any values been found, but this may yet prove to be important and significant.

*Laura J.* and *Ward* lie along the steep face of the slate cliffs parallel to the Wagner vein, and a narrow vein of silver-bearing galena can be traced for a considerable distance, assessment work on which is said to have given very favourable results.

*Death-on-the-Trail*, *Little Tommy*, *Bell Flower*, etc., owned by the Duncan-Lardo Mining Co., were recently located on stringers of galena in the slates underlying the limestone of the "Lime Dyke." Assessment work was being done.

The *Abbott*, *King William* and *Marion* lie south-east of the "Francis Jewell," in a large basin, drained by a branch of Healy Creek. On the "Abbott" claim there is said to be a small vein of about 20 inches wide of galena high up on the steep side of the "Lime Dyke," to tap which a tunnel was being driven (now in about 300 feet) until two men were killed in a snow-slide, since when no work has been done.

This property lies up in the high basin east of the "Lime Dyke" to the south of and about 1,000 feet above Hall Creek. Three galena veins are reported, but only a few shallow surface cuts have been made to develop. This galena is said to carry medium silver values, one assay returning 35 ozs. silver, about \$5 in gold per ton, and 70 % lead.

#### CARIBOO CREEK.

Prospectors were busy during the past season up this creek, which lies westerly from Hall Creek, and important finds were reported on claims staked off on both sides of the "Lime Dyke."

#### LARDEAU DIVISION.

No attempt was made to examine this district to the north-west of the Trout Lake region, as very little work has been done, and no account could be obtained of any important discoveries made as yet. This region is said to be very mountainous and trails are scarce, although one leads up Fish Creek for several miles. Some prospectors were entering this district by the way of Ferguson.

## RETURNS FROM MINING RECORDERS..

Details.	Ainsworth.	Arrow Lake.	Goat River.	Nelson.	Slocan City.	Slocan.	Trail Creek.
Number of Claims recorded.....	1,982	252	372	2,097	312	1,489	1,864
" Certificates of Work.....	968	.....	105	1,502	311	1,078	1,627
" Certificates of Improvements.....	.....	.....	2	22	.....	104	160
" Bills of Sale, Transfers, etc..	1,312	169	138	1,356	224	1,537	1,507
" Abandonments.....	.....	2	.....	20	.....	12	99
Free Miner's Certificates.....	1,798	300	143	2,288	136	2,366	4,699
Money paid in lieu of work.....	.....	.....	2	14	.....	20	28

## LILLOOET DISTRICT.

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A short visit was paid to the town of Lillooet, in order to visit a few of the properties on Cayoosh Creek that had attracted much attention by the discovery of fine samples of quartz and free gold. The town of Lillooet, one of the oldest in the interior, was an important point in the early days of Cariboo, as it was on the main line of travel thither until the road was built in from Yale and Ashcroft. It is beautifully situated on the west bank of the Fraser, above the confluence of the Cayoosh Creek and the river flowing out of Seaton Lake, and below that of Bridge River, and is noted for its very equable climate, many kinds of fruit being grown on irrigated land.

An excellent road runs from Ashcroft through the Marble Canyon and then along the Fraser River, a distance of about 70 miles, and another road is being built from Lytton along the east bank of the Fraser. A road leads to Seaton Lake, and then up Cayoosh Creek to the "Golden Cache" and other properties, and a trail has been opened up along Bridge River.

During the past season, many prospectors have been busy, as stated below in Mr. Soues' report, in the country about 60 or 70 miles up Bridge River, where is a very large extent of country hitherto little known even to the prospector, with even greater areas, perhaps, not yet explored. Gold-bearing quartz ledges have been located, on which some work has been done and much more is about to be done, and during the coming season the field of exploration will be very much more extended, as trails and other means of ingress are provided. Geologically, practically nothing is known of this region, but on Bridge River, where most work has recently been done, the formations are said to consist of eruptive rocks of different kinds.

For many years, the bars and benches on the Fraser, Bridge River, Cayoosh and other creeks have yielded gold, but very scanty attention was ever paid to the sources of this gold or the quartz leads until the discovery of the "Golden Cache" lead proved a great incentive to much greater and more extensive prospecting for quartz veins, although work had been done several years before on the quartz veins on Cayoosh Creek, as on the "Bonanza" claim. This awakened interest will lead to the opening up by trails and to the exploration of a large region here on the eastern slope of the Coast Range.

In a former report, considerable was written about the value of assays of quartz carrying free gold. To everyone familiar with gold-quartz ores, it is known that fire assays on this class of material are almost always valueless, in that a series of assays made of the same sample is very likely to give most variant results, and it is very difficult to thus determine the average values of the ore in such a lead. It is very easy to get wonderful returns from picked samples so as to astonish the inexperienced public, who do not know that an assay may not always be true, but very misleading, and such assays are many times paraded to tempt purchasers.



The system of averaging a lot of assays that may run from zero to high values is both erroneous in principle and pernicious, as, while zero assays may be near the average value of the ore, the chance high returns from picked or exceptionally good samples will be sure to give high but utterly fictitious results. This method of taking the average of the assay values from a number of samples from a vein is often pursued, but not by men experienced in valuing gold-quartz, and it is an old story that mill returns are so many times disappointingly lower than these so-called average assays.

Hence the point wished to be made is that assays of quartz with free gold should be accepted with very great caution, it being kept in mind that such assays may only serve to demonstrate the presence of gold in the rock, but not what values the mill may return when large lots are treated.

#### CAYOOSH CREEK.

The Golden Cache Mines Co., Vancouver, capital stock \$500,000 in 81 Golden Cache. shares. Superintendent George T. Rives, Lillooet, owns the following claims:—"Golden Eagle," "Ruby," "North Star," "Golden Stripe," "Moonlight" and "Intermediate" fractions, located on the steep mountain sides north of Cayoosh Creek, twelve miles from Lillooet, and the "Jumbo" on the south side.

*Topography.*—The country traversed by Cayoosh Creek is exceedingly rugged, the mountains being very precipitous and lofty, many of the cliffy sides being vertical, while the creek runs through a deep and narrow gorge.

When this lead was discovered by a half-breed hunter, this country was almost too difficult for access even by a very bad trail. Now a fair waggon road with very steep grades both ways, has been built from Seaton Lake 10 miles up along the steep mountain sides, often crossed by rock slides, to the site of the stamp-mill on Cayoosh Creek, where the three-rail gravity tramway leads up to the foot of the ore-shutes below the perpendicular face of rock, in which is this body of quartz.

*The Mine.*—At the time of visit all entries to this mine were blocked up with ore awaiting the completion of the mill, hence the underground workings could not be seen. However, near the summit (*see illustration*) of a nearly vertical bluff, and in the face of this bluff at a height of about 1,700 feet above Cayoosh Creek, running diagonally across with a pitch to the north of about 20 degrees, was seen the ledge traceable for about 450 feet, or a lens-shaped body of quartz about 20 feet thick at the centre, and narrowing down to a narrow stringer at either end. It was claimed that the vein could be seen again along the trend of this vein, as on the "Alpha Bell" on one extension, and the "Golden Stripe" on the other, but this was not traced out.

This lead dips into the mountain at an angle of about 12 degrees from the horizontal, but when in a distance of about 100 feet, where there is a winze 28 feet at the end of a tunnel, the dip is said to suddenly become much steeper, but not enough work had apparently been done to disclose just what the conditions are at this point. The vein is apparently conformable with the enclosing black argillite-schist, and while the main mass consists of bands of milk-white, barren-looking quartz, there are broad and narrow bands of quartz interbanded with a little slate, the whole mass being twisted and crumpled.

Very fine samples of free gold have been taken from this ledge, but in **Gold.** the main body nearly all of the central mass appears to be very barren, while most of the gold is said to be in two or three feet of quartz near the foot and hanging walls. Free gold is visible in many samples, but generally along the narrow seams or lines between the bands of quartz where there is also black, carbonaceous matter from the slates. But gold is seen both in the solid quartz and in the slates of the walls.

The proper development of the mine has just begun, and it is yet impossible to say what values this large body of quartz may carry in gold, but so far the returns from several hundred tons treated in the stamp-mill have been disappointing, or very much lower than were anticipated by the owners, the returns for 755 tons first crushed being about \$4.45 per ton. The amount of sulphides in this ore is extremely small so that the amount of concentrates will be practically nil, unless in depth the quartz carries more sulphides.

In working the first openings into this body, it was very difficult to get at it on the bare surface of the cliff, but Mr. Rives now has a strong platform built with a short 3-rail tramway to the head of the shutes that lead down to the main tramway.

**Mill and Tramway.**

A three-rail gravity tramway leads from the mill up to the ore-shutes, or to a point 270 feet below the ledge. It is 2,200 feet long with a drop of 1,400 feet, and has a  $\frac{3}{4}$ -inch steel cable, with a 2-ton car on each end. According to the first designs and contracts let, the lower end of this tramway was so low that no allowance was made for the dumping of the car at the mill, so that after a short mill-run had been made to satisfy one of the largest purchasers then at the mine (and just at the time of the writer's inspection), the mill was stopped until the lower end of the tramway could be raised to permit the car to dump automatically. The cost of this tram was about \$10,000.

The mill, built by the Wm. Hamilton Manufacturing Co., L'td., Peterboro, Ont., at a cost of about \$10,000, consists of two batteries of five stamps, each 850 lbs., dropping 6 inches, 96 times per minute, with inner copper plates, back and front, and outer coppers 4 by 8 feet, and 40-mesh slotted screens; Reliance Blake crusher above an 180-ton bin; two Reliance feeders; two, 4 by 12 Frue Vanners; one, 90-h.p. engine, and one small 5-h.p. vertical engine for vanners; 1 boiler; saw-mill and planer; steam pump at creek.

This mill, built on the bank of the creek, can easily be enlarged to 20 stamps; Cayoosh Creek carries a good supply of water and a fine water-power can be got a quarter of a mile below the mill, where electric power and air compressor plants may be installed, but until the true value of this ore-body is accurately determined by the present mill, further erection of plant, etc., will be very inadvisable.

This property attained a very sudden and far-reaching notoriety, by reason of the fine specimens found, and it is sincerely hoped that this large body of quartz will yet be found to carry high enough values to permit remunerative returns.

**Excelsior.** The Excelsior Gold Mining Co., L'td., Vancouver; Secretary, Jas. D. Byrne, owns the "Excelsior" claim, lying along the mountain side, south-  
erly from the Golden Cache claims. A tunnel had been started in the

steep hillside on a vein 2 to 10 feet wide, of bluish-white quartz free of sulphides. This vein runs diagonally up the mountain side, and is exposed for about 600 feet. The tunnels runs level, N. 70° W., for 25 feet when the vein begins to dip westerly on a dip of about 15 degrees, changing at 50 feet to 30 degrees to the face or 120 feet from the entrance. There is a large amount of this white, hackly quartz showing all the way, but towards the end of the tunnel it is intermixed with some slate. Some good assays in gold have been obtained from some of this material, but gold is seldom found on making panning tests. Cabins were being built, and five men were at work.

The *Alpha Bell* claim, on which in the steep face of a high bluff a small vein of quartz is reported a short distance north of the "Golden Eagle," was not visited, nor the "Bonanza" where no work had been done for some time.

*Cayoosh Creek Mines, L'td.*—This Company, Secretary F. Robertson, Vancouver, had secured five claims on the opposite side of Cayoosh Creek from the Golden Cache properties, and Mr. Vallean was doing some work to prospect some small showings of quartz situated about 1,000 feet above the creek.

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#### REPORT BY MR. F. SOUES, GOLD COMMISSIONER, CLINTON.

"The total yield from the District (ascertained from reliable sources only) is \$39,840, an increase on the yield of last year, but still far below the average of former years.

"Mr. A. W. Smith, of Lillooet, is again the largest buyer of gold and, in response to my application to him for statistics, he writes: 'I am sorry that I have to report to you that the gold yield of this section is steadily decreasing. During 1897 I only bought \$22,600 worth. Fraser and Bridge Rivers produced most of it. I am unable to form any estimate of the number of miners engaged in producing it. I think about \$500 is the result of white labour, about \$1,000 Indian and the balance Chinese.' Mr. Smith's estimate of who were the producers in the neighbourhood of Lillooet may be taken as a fair estimate of the District.

"This year may be characterised as one of fevered and profitless excitement, with an indiscriminate staking and recording of alleged mineral claims, in total disregard of the sanctity of an oath and the requirements of the Mineral Act, working incalculable harm to the mining future of the District.

"In the monthly returns received from Mr. Phair, Mining Recorder at Lillooet, I find that in the first three months of the year 201 claims were recorded by him, principally on Cayoosh Creek and immediate neighbourhood. The information given to Mr. Phair by the parties making these records set out in glib terms the nature of ore, the nature of foot and hanging walls, average width of seam, distance of seam traceable on surface, etc., etc., and at the same time the whole of that part of the District was covered with from one to four feet of snow. It is safe to say that not over 5 per cent. of these claims have had any development work done on them, and meantime numbers of them have been sold.

**Quartz.** "In this class of mining the scene of excitement has changed from Cayoosh Creek and Blackwater to the upper waters of the South Fork of Bridge River and tributaries. The Blackwater claims may be dismissed in the meantime with brief notice. They may be very valuable, but there has been no attempt at anything like actual development.

"With regard to the various claims on Cayoosh Creek, I am advised that development work to the extent of \$1,000 each has been done on the 'Mineral Point,' 'Eagle's Nest Group,' 'Tug of War Group' and 'Ample Group,' while work has been continued on the 'Golden Cache Group' throughout the year.

"The president of the 'Alpha Bell Company's' claims on Cayoosh Creek reports that, '235 feet of tunnelling have been run on different ledges, some of which have assayed very high, while others have averaged low. As, however, none of the tunnels are in over 60 feet, we are of the opinion that with depth the ledges will gain in value. We think this especially the case with the tunnel on the 'Surprise' claim, which has exceeded our expectations, having assayed up to \$1,000 per ton. Three of the ledges on our Cayoosh Creek property are still untested.'

"Mr. Jensen, superintendent of the 'Excelsior Gold Mining Company,' reports in regard to the 'Excelsior' mineral claim, situated on the north bank of Cayoosh Creek, and about 1,000 feet above the creek: 'Active development commenced on the 1st of May last, and has been continuous up to the end of the year. The ledge shews on the surface for a distance of 700 feet, foot wall, slate; hanging wall, conglomerate. A tunnel was run on the ledge where it was 6 feet wide on the surface, and it increased to 9 feet wide at 163 feet, the inner end of the tunnel. The character of the rock is free-milling white, to white and blue quartz with fine veins and seams of talc. Assays made during the progress of running the tunnel gave from traces to \$177 per ton in gold.'

"No work has been done on the 'Bonanza' group of mines during the past year.

"A passable road has been made from Seaton Lake to the Golden Cache Co.'s claims and available for all the claims on Cayoosh Creek. This road to a great extent in its entire length is practically a narrow shelf along the deep mountain sides. Unnumbered engineering difficulties were in the way of its construction, and it still requires a great deal of improvement, which is a matter that can safely be left with the Department of Lands and Works.

"I am very much pleased to be able to report that rich gold-bearing **Bridge River.** ledges have at length been found on the upper portion of this river and its tributaries south-west from Lillooet about 70 miles. The various samples of rock I have seen may be described as a white sub-translucent quartz, carrying native gold, with considerable iron and possibly arsenical pyrites, and a notable absence of the grey chloritic schists universally accompanying Cayoosh Creek quartz. The 'Forty Thieves' group of mines, on the South Fork of Bridge River, was located in July, 1896, and the manager, Mr. Williams, reports to me, under date 21st inst., that:—'The vein is a true fissure, averaging about 4 feet in width, situated in a syenite formation with a small streak of porphyry on the hanging wall, and exposed to the depth of about 400 feet. The ore consists of free milling gold-bearing quartz, with traces of copper and silver. The outcrop is traceable for 6,000 feet, with a strike S.E. and N.W., and the dip is 64 degrees.' The 'Ida May' group, embracing three locations, was located in August and September last, and is situated on Cadwallder Creek, and is now owned by the Alpha Bell Gold Quartz Mining Co. The president of this company, Mr. G. E. Bower, reports to me that 'the work done shews a well-defined fissure vein, 3 feet wide, cased with dioritic slate on the hanging and porphyry on the foot wall. The trend of vein is N.E. and S.W., dipping northerly at about 15 degrees. We have stripped the vein 40 feet, and it shews free gold as far as stripped. A tunnel has been driven at the north end of the stripping for 50 feet, following the slope of the vein, in which a continuous ore shute shewed for the whole distance down. According to assays, the average value across the

ledge is \$40, though we have had very high assays not included in this average. The vein contains about 5 per cent. of sulphurets, carrying high values, which can be saved by concentration and chlorinated on the ground. The 'Ida May' is the only claim that is developed to any extent, but the surrounding prospects are apparently of the same character. From the open cuts made on them, we find that there is a free-milling belt from 10 to 12 miles in length, running parallel to Cadwallder Creek and the South Fork of Bridge River'.

"The result of these discoveries is that the prospector has for the time being abandoned Cayoosh Creek, and his whole energies are now devoted to the immediate neighbourhood of the 'Ida May' and others. Mr. Phair advises me that he has entered record of 55 claims on Tyaughton Creek, 175 on Cadwallder Creek, and 190 on Bridge River and South Fork.

"As stated in my report of last year, I am not aware that this portion of the district has ever been visited by any of our eminent geologists, and of the geological conditions nothing whatever is known. Sufficient for me at present is the fact that the whole of the Bridge River section is situated on the inner slope of the Coast Range, and while it may not have been subjected to the same dynamic ordeal that has taken place in the valley of Cayoosh Creek, I have no doubt it has to some extent been roughly shaken, veins contorted and broken from perpendicular to horizontal and general dislocation of the strata. I would also infer from Mr. Bower's report, as to the quantity of sulphurets, that there is the chance of the ore changing with depth from free milling to rebellious, and would urge on the owners of all the claims in that neighbourhood thorough and exhaustive exploration and development under skilled management before going to the very great expense that may be incurred in placing heavy machinery in, at present, a very inaccessible portion of the district.

"I regret that so far nothing in gold-bearing quartz has been discovered on the Lower Bridge River in the neighbourhood of the North Fork and Horseshoe Bend, and trust that prospectors will, in the coming year, give this section more attention.

#### **Bonaparte River.**

"The mania for staking off claims extended to this part of the district, and in March and April over 60 claims were recorded by me, the greater proportion supposed to be on some imaginary line with the claims being developed by the B. C. Development Co., and the owners of the 'Maggie.'

Needless to say that nothing worthy of a certificate of work has been done on any of them, with the exception of the last two named, and the 'Mountain View' group of five claims. The B. C. Development Company is a development company in the true meaning of the word, at least so far as their claims on the Bonaparte River are concerned. I wish there were many more such in my district, and their position at present requires extended notice.

"In July, 1896, the Company located 8 mineral claims on which, principally on one claim, active exploration and development has been continued ever since. After survey of these claims last spring, they recorded 4 fractional claims. The principal work has been done on the 'Avoca' claim, and under the superintendence this year of Mr. L. W. Farish, M. E. It is refreshing to pass through the underground works of this mine, and note everywhere the evidence of a master mind guiding and directing everything, and in such marked contrast with the underground work in other mines in this district. In the 'Avoca,' in tunnels, air shafts, and winzes, there are nearly 2,000 lineal feet of excavations, and at the present writing development is being actively prosecuted. Mr. J. R. Mitchell, the general superintendent, reports to me that: 'The country rock is a fine-grained porphyry, the feldspar may be anorthite. This band of rock, which may be termed a dyke, is about a  $\frac{1}{4}$  of a mile wide, its out-crop can be traced very readily for a distance of 2 miles. The rock is very much shattered, and there is a great deal of pyrite in the fractures. On the 'Avoca' claim a lode has been discovered which is from 6 to 12 feet wide, having an easterly and westerly trend, and dip to the south at an angle of 75°. The ores that have been found in this lode are copper in various forms. At the surface the ores were chalcantite (sulphate), malachite and azurite (carbonates). At a depth of 60 feet the ore is tetrahedrite, with occasional pieces of chalcopyrite. These ores are found in veins from 2 inches to a foot in width in the lode, the gangue of which is quartz.' A recent shipment of several tons of this ore for a test smelting, gave satisfactory results. The veins of tennantite or sulpharsenite of copper, occurring in this ore, when freed from all gangue matter, give returns of 41.51 % copper, and 69.5 ounces of silver per ton of 2,000 pounds. The company has expended between twenty and thirty thousand dollars in development, including cost of surveying. In addition to this amount has to be added the price paid on application for Crown Grants, viz.:—\$2,300. The whole of this group of claims is within the railway belt, and so located, cost \$5 per acre. They have worked on in the most quiet and

unobtrusive manner, and although within a few feet of the waggon road, their presence in the district is hardly noticed.

"From Dr. Dawson's report on the general features of the valley of the Bonaparte, from Hat Creek to Mundorf's, and the practical knowledge gained by the explorations of the B. C. Development Co., and a few others, I would infer that the rocks in the whole of this region, where mineralized, are principally cupriferous and argentiferous, with a small amount of gold. The lodes carrying these minerals are, as a rule, at a considerable depth, and will require careful management, and the expenditure of much capital to reach them. No doubt the lode in the 'Avoca,' to which Mr. Mitchell refers, is sufficiently mineralized and of ample dimensions for concentration, but this will necessarily require the expenditure of a large amount of money in the erection of reduction works. On the eastern side of the Bonaparte, and above Scotty's Creek, geological conditions are different, and free gold bearing ledges may exist, but so far none have been located. Fourteen mineral claims were located on Mahood Lake and Mountain in the early part of the year, but there has been no development done on them. Two claims were located on Dog Creek, on which work has been done, but I am not aware to what extent.

"On the Big Slide nothing has been done during the past year. On seven claims supposed, to be extensions of the Big Slide lode, development work has been done sufficient to justify the issuance of certificates of work in each case. By the failure of the first quartz mill erected, and mining done in 1886 on the 'Big Slide,' and the result of the recent preliminary test by the Golden Cache Co. on Cayoosh Creek, quartz mining and milling in this district have received a serious check.

**Hydraulic Mines.** "With the exception of the Lillooet Hydraulic Mining Co. this class of mining is still in the preliminary stage. I have good reason to believe that the whole of the locations held by the Bridge River & Lillooet Gold Mining Company on the Horseshoe Bend will pass to an English company this coming year, when active work on a large scale will be commenced.

**Dredging.** "I am very glad to be able to report that the question of dealing with the débris under the waters of Fraser River has at last been partly solved by the New Fraser River Gold Mines Co. This end has been attained by determined perseverance, and the expenditure of a very large amount of capital. Mr. W. F. Gore, the General Superintendent for the Company, in response to my request for a general report, writes to me on the 24th inst.: 'We have made dredging a known quantity and an absolute success, not through the medium of any new invention, or combination of patents, but through the operation of a harbour dredge of the kind known as the Dipper Dredge, which was built to our order by the Marion Steam Shovel Co., of Marion, Ohio. The dredge lifts one and one-half yards of material at a time, thus enabling us to wash from a thousand to twelve hundred yards of material per day. For sluicing purposes we have two direct connection centrifugal pumps, which raise about 7,500 gallons of water each per minute. These discharge into hoppers above the grizzlies, and the sluices and usual riffles do the rest. To my mind it is one of the neatest and prettiest mining operations ever conducted. The scow or vessel on which the machinery is placed is 82 feet by 38 feet. The boilers are 80 to 100-horse power, with engines powerful enough to lift 55 tons.' In a personal interview with Mr. Gore since receiving his report he informed me that the vessel and machinery were finished about the end of October last, and they hauled out into the stream for a test and to smooth bearings. Everything worked to perfection; the dipper went under the water and came up full, bringing to light a number of curios, as corroded nails, files, pick points, which go to show that they were then on the site of ground that had been wing-dammed over 20 years ago, and the summer floods of all that time had been unable to move these relics but a very short distance at most. Mr. Gore also handed me specimens of micaceous iron and small nuggets of water-worn copper, found in the general débris. He also informed me that water-worn boulders of lignite coal are found there. The gold result here was a few ounces. Everything being a success they hauled up stream and commenced work in earnest in the early part of November last, when cold weather set in and with the result that the river fell suddenly and they found themselves high and dry, with the exception of the trough which the dredger had dug for itself. The cold had become so intense that they could do nothing with the contents of the sluice boxes, and the whole of the washed material is still in the boxes and likely to remain there for the next two months. Mr. Gore said that it is the intention of the company to add an electric light to their plant and run day and night and, in future, haul

into winter quarters at the beginning of November, as they have had sufficient experience now of the very uncertain winter weather that may prevail at Big Bar.

Both Mr. Gore and Mr. Davidson, the mechanical engineer, assure me that they are perfectly satisfied that they can handle the gravels in the Fraser River. All they ask is that there shall be a little gold in the gravel. The gravels last worked are from 3 to 4 feet thick, resting on a stratum of hard pan. By way of testing the dipper, they passed it through the hard pan until they reached another stratum of gravel, consisting of small water-worn stones. In addition to gold in the gravel, I have no doubt platinum, and the other members of the platinum group, will be found (I know that platinum is found in the river gravels at Big Bar, and also on some of the bars below Lillooet). This company is eminently deserving of success; they have had to deal with innumerable obstacles, as usual in commencing an enterprise of this nature. The lumber for the construction of the vessel and buildings had to be cut from the nearest forest, and hauled over a rough road to the place where the building was done. All the machinery, some of it very heavy, such as the boilers, had to be hauled from Ashcroft over the greater part, a narrow mountain road and again down to the level of the Fraser. Fortunately all has been done without loss or accident of any kind. The vessel is in anything but a safe place, but is moored by steel cables as securely as possible under the circumstances, and will be hauled into safe quarters as soon as the river rises sufficiently. With the success attained by this discription of dredger, I have no doubt others will follow next year. There is ample room for a fleet of them in the District of Lillooet. The dredger at work below Lillooet Bridge, referred to in my report of last year, was found to be a failure, and I understand the Company proposes using a different style of machine.

"The following abstract shows the mining transactions in the District of Lillooet for the year :—

"Recorded,	Mineral Claims.....	1,135
Conveyances of	".....	348
Abandonments,	".....	4
Certificates of work,	".....	139
Water grants for	".....	3
Recorded,	Placer Claims.....	6
Re-recorded,	".....	4
Water grants for	".....	7
Conveyances,	".....	9
Dredging leases in force, Placer.....		15
" applied for.....		4
Hydraulic mining leases in force.....		41
Free Miner's Certificates.....		\$2,755 00
Mining receipts general.....		9,997 20"

## NANAIMO DISTRICT.

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### TEXADA ISLAND.

For many years exploratory, and even mining, work has been carried on at irregular intervals on this island, but during the past two years interest has been greatly revived and several properties are now being actively prospected. Prospecting has been, as far as the interior of the island is concerned, confined to the northern portion, probably because to the south no discovery has yet been reported and the underbrush is much denser; hence the upper ten miles of the island has been pretty well located.

### LOCATION.

The island, lying in the Straits of Georgia between Vancouver Island and the Mainland, about 90 miles north from Victoria and 40 miles from Vancouver, has a length of about 27

miles, and an extreme width of 5.5 miles. Topographically it is very rocky and mountainous, and the bold and rocky shores are such that no good harbours are afforded except some shallow bays exposed to certain winds that prevent, when blowing hard, landing from the steamer. In this northern part the timber is good but not thick, and the underbrush is comparatively light, the ground being very rocky from the very large angular boulders and the jagged, cliffy character of the rock formations.

#### GEOLOGY.

Dr. Dawson, in the Geological Report, 1886, page 32, reports:—

"Texada Island is composed, for the most part, of the rock of the Vancouver (Triassic) series, and chiefly of altered volcanic materials. These are, however, traversed by somewhat important granitic masses particularly on the north-east shore, while the northern extremity of the island, for the length of five miles, is largely composed of more or less crystalline limestone, which is frequently a true marble. Deposits of copper, marble and magnetite iron ore have been located on the island, and work undertaken on them, though the last mentioned mineral is the only one of which the exploration has attained any importance. \* \* \* The association and inter-bedding of volcanic rocks with the marbles of the northern part of the island, and the intercalation of these limestone beds with those of the southern portion, indicate the close relationship in time, of the two classes of rock.

"Point Upwood, and the southern end of the island in its vicinity, is composed of hard, massive, greyish and greenish-grey rocks, many of which, though much altered, are still evident agglomerates, and show their fragmental character on weathered surfaces.

"On rounding the south-east point of the island, well-stratified greenish and *grey feldspathic hornblende* and *schistose* rocks are met with, presenting a ribboned appearance on weathered surfaces. They are not far from vertical in attitude, and the strike, which is fairly regular, nearly coincides with the coast, causing the same rock to characterize it for several miles northward. These rocks are closely associated with *agglomerate* and *ash rocks*, which sometimes replace them on the shore, and eventually preponderate and occupy the coast to the exclusion of other materials to a point nine miles north of the south point. Thence, for three miles, the only rocks seen along the shore are *grey hornblende granites* of coarse or medium grain. Beyond these, greenish-bluish and grey rocks, composed of altered volcanic materials, again appear, and occupy the shore to a place abreast of Scottish Fir Point. These rocks are here even more completely altered and hardened than usual, being traversed by dykes of dark greenstone and some of granite. They are extremely shattered, and jointage places, coloured by copper, were observed in several places. At north-east point of the chart, and for nearly two miles south-east from it, the shore is again occupied by granitic rocks, which, near their junction with the volcanic series, hold numerous dark fragments, as is usual at such junctions."

Nearly all mining and prospecting are practically confined to a strip across the island about three miles wide or north of a line from the Iron mine to Spratt's Bay, but there is no reason why, from geological conditions, that prospectors should not find veins in other parts of the island, as hitherto they have kept close to the trail that runs from the Iron mine to Van Anda Bay.

Within this strip the formation consists mostly of highly altered, fine-grained, dark green amygdaloidal rock of the volcanic series, but the crystalline limestone appears frequently and bears an important relation at the "Van Anda," "Raven," and "Iron" mines.

#### VEINS AND ORE DEPOSITS.

(a.) Bornite, or peacock copper ore, along a dyke where it cuts through the crystalline limestone at the "Van Anda" mine. Several hundred tons of this ore have been shipped:

(b.) Chalcopryrite, or yellow copper, in the altered volcanic material near contact with limestone, as at the "Raven" and "Little Billie."

(c.) Magnetite, with some chalcopryrite, in granitic mass at contact with limestone, as at the "Iron" mine.

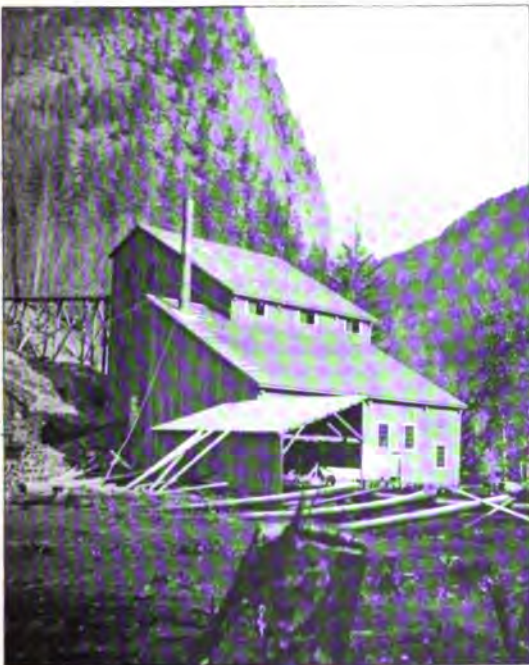
(d.) Quartz veins with free gold, traversing the altered amygdaloidal rock, as at the "Victoria," "Texada," "Potosa," "Lorindale," etc. These veins are small, from 2 to 20 inches wide, but near the surface on some of these have been found very fine samples of free gold, but in depth they are found to be irregular in size and to carry considerable sulphureta.

Veins follow, of course, lines of fracturing in the altered volcanic rock, and along these lines is seen the evidence of motion in the smooth walls. The quartz is not always found to be





PLATFORM ALONG VEIN IN FACE OF CLIFF.



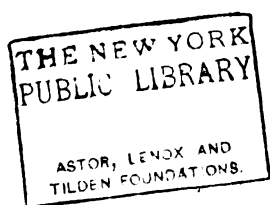
STAMP MILL.



THREE-RAIL TRAMWAY.

GOLDEN CACHE MINING Co., LILLOOET, B. C.





continuous, but in places the greyish-green altered country-rock is impregnated with sulphides, such as iron and copper pyrites, and sometimes a little galena, and also gold. Running parallel with these veins, are often seen smaller quartz stringers, also mineralized.

#### CONDITIONS.

In the revival of interest that has led to the amount of prospecting done during the past two years on the island, there have been three factors, (a) the discovery of gold values in sulphides similar to those at Rossland; (b) the extraction of gold in small quantities from these small quartz veins by crushing in a small mortar, and panning rich decomposed surface material, by which one or two men have made a living for years; (c) the discovery of the "Van Anda" ore-shute.

Little idea can yet be formed of the prospects of mining on this island, but the considerable amount of work now in progress and to be detailed below, will greatly serve to show what values may be in these various veins and deposits. It can be said that the values now being got (not referring as to the "Van Anda") in this initial work although not high, are such as to encourage much more work, to learn whether depth will disclose better quantity and quality of ore, and, as in nearly every new district, this preliminary work must simply be awaited when surface indications give but very scanty clues.

On the "Van Anda," the small and insignificant out-crop discovered, has proved to be only a small pointer or index to a much larger ore-body below, and on some of the properties, the small surface indications may be found to cover important leads.

#### ROADS AND TRAILS.

From Van Anda Bay a road extends inland about a mile, thence a trail leads down to the "Raven" mine on Spratt's Bay, and another crosses the island to the road now built, two miles from the iron mine on the West Coast.

This road may be shortly continued across the island. Trails also run to the different group of claims. The highest elevation on the trail from Van Anda, across the island to the Iron Mine, is a little over 700 feet.

#### TRANSPORTATION.

The schedule of steamboat dates is often changed, but during the past autumn one steamer a week was running from Victoria *via* Nanaimo, and from Vancouver two steamers twice a week for all points along the east coast of the Island and points on Mainland, so that supplies could be landed cheaply at any point if weather was not bad. In shipping ore, scows were loaded then towed to port at a cost of \$1.50 to \$2.00 per ton.

#### WATER AND TIMBER.

Small streams supply fresh water, but Kirk and Priest Lakes, if converted into storage reservoirs by dams easily constructed, will supply a considerable amount of water for power purposes. The timber is good and plentiful on the island, very suitable for mining work.

#### TITLES TO LAND.

A considerable amount of land has been taken up as pre-emptions, upon which the locators of any mineral claims may be required to put up a bond to indemnify the owner of the pre-emption for any damage that may be done in prospecting and mining, and only the precious metals can be taken by the owner of the mineral claim. However, there are maps showing the position of these pre-emptions, and the rest of the land is open to location if not already staked off by other prospectors.

#### MINING OPERATIONS.

As many as possible of the working claims were examined, but several being opened up this winter could not be reached in the limited time at disposal, November 10th to 16th.

The Van Anda Copper and Gold Mining Company, capital stock, **Van Anda.** \$5,000,000; President, Ed. Blewitt, Seattle, owns a large tract, or 840 acres of land on the north-east side of the island, and work has been done on two claims, the "Copper Queen" (Van Anda mine) and the "Little Billie."

*Copper Queen* or "Van Anda" mine. This ore-body, consisting of bornite (peacock copper) and some chalcopyrite, with gold and silver in a feldspathic, calcareous and garnetiferous gangue betrayed itself in one place where a little band, 6 to 14 inches wide, of this beautiful ore cropped out in the very crystalline limestone. Here a shaft was sunk vertically 32 feet until it encountered a dyke cutting across the ore, after which this shaft followed down, but in ore, along the wall of this dyke on a pitch of about 70°, to the depth of 103 feet.

*Mine.* It is now seen that this ore-body is intimately associated with a light-coloured body of garnet rock which traverses with a strike, north 30° west, the limestone marbled with places of contact. At an opening on the surface at the site of the new shaft this mass is only 2 feet wide, and the ore occurs on either side in both it and the limestone, but on the 100-foot level below it is 15 feet thick, the ore shute worked out down on one side being continuous and, in places, 6 to 7 feet wide of bornite in stringers and bunches, with this rock and some of the marble as a gangue. A cross-cut here in this mass shows a little ore on the other side where the ground should be carefully prospected, as it is quite possible an ore-body may be there located.

This shaft is very crooked, but it has served its purpose for prospecting. At about 50 feet a drift was run 128 feet south-easterly, and above it a stope about 70 feet long of 2 to 5 feet of mixed ore has been worked out nearly to the surface. On the 100-foot level in the drift 135 feet to the south-east the ore-shute continued for nearly 80 feet, but nearly all ore was stoped out leaving, at the widest point, 5 to 6 feet of good, but mixed ore in the bottom where the new shaft will be sunk after an opening is made to the surface. To the north-west this drift cuts through the large porphyry dyke mentioned above, and that out-crops about 65 feet north-west of the shaft, and also a second but smaller one, but although 175 feet of work has been done here, the continuation of this ore-body north-west of this big dyke has not yet been found.

Hence there has been so far developed an ore shute 80 to 100 feet long and 1 to 7 feet thick of this mixed auriferous bornite ore, nearly all of which above the drifts now run has been mined out and sorted into three classes, of which the first class has been shipped. A proper working shaft will soon be down to the 100-foot level, after which sinking will be continued if sufficient capital is secured to provide a good plant and to permit more extensive and proper development.

*Ore.* About 300 tons have been sold, which averaged .34 ounces in gold, 6 ounces in silver, and 6.2 per cent. of copper. The gold contents, according to the degree of hand-sorting, run from \$2 to \$18 per ton, the silver from 3 to 10.5 ounces, and the copper from 3 to 18.5 per cent. Hence, while the second-class ore runs from \$9 to \$ per ton, the first-class or sorted runs from \$33 to \$42. On account of its very calcareous gangue, very low smelting charges have been secured from Mr. Pellew-Harvey, agent for Vivians & Sons, Swansea, and as it is sent from Vancouver in ballast, shipping charges amount to only \$2 per ton, or the cost of transfer in waggon three-fourths of a mile from the mine to Van Anda Bay, where it is loaded on a scow and then sent to the above port, sampled, and then sent on board the sailing vessels for England.

*Plant* now consists of a small engine, hoist, and pump, but at the new shaft it is proposed to install a better plant of boiler, hoist, pumps, and air compressor.

*Water.*—In the mine, 45 gallons per minute are now handled, but a stronger pump will be necessary, especially in the rainy season, when the creviced limestone lets in much surface water.

*Labour.*—Most of the work has been done by Chinamen at \$1.25 per day, but in November both whites and Chinamen were engaged, the latter of whom have to be taught from the very beginning, but never learn to strike with either hand. At the landing, near the little Van Anda Bay, and at the mouth of the creek, from Priests Lake, are built boarding and bunk houses, store, etc.

*Little Billie.*—About 1,500 feet north of the Van Anda mine, and 100 yards from the beach, work was done many years ago on a very irregular deposit of chalcopyrites and iron pyrites, but no bornite, that is found in the crystalline limestone at its contact with eruptive granite. On a tunnel and shaft \$18,000 were then spent and the present company has done some work in this tunnel and on the surface, and in 1896, 30 tons of ore were gathered up and shipped to Everett, yielding, it is stated by Mr. R. Blewitt, 18 ozs. silver, \$4 to \$5 in gold, and 12 % copper.

At the mouth of the tunnel the ore is about 18 inches thick, but in the tunnel and down the shaft the ore was always found mostly in stringers and bunches in the limestone, associated with the garnetiferous rock seen at the Van Anda, also garnet and tremolite. No work was done here during the past year.

The *Raven*, *Chief* and *Joan*, 400 yards by waggon road from Spratt's Bay, and three miles south, by trail from the "Van Anda," are owned by Messrs. Ed. and Wm. Blewitt, C. J. Spratt, Jno. Wilson, *et al.*

On the "Raven," where on the surface, along the strike for 30 or 40 feet, more or less copper pyrites were to be seen, in one part 3 feet wide, a 6 by 9-ft. shaft had been sunk 98 feet, but apparently along the edge of the ore-shute for very little ore was found, but at 40 feet a drift was being started to run under the ore showing on top to the south, and at the time of visit (November 14th) there were five feet of mixed ore or chalcopyrite mixed through the greenish altered eruptive rock lying next to the crystalline limestone, which here formed the hanging wall in the shaft, but did not show here on the surface. The ore was being sorted, and 3 or 4 tons containing a good percentage of copper pyrites were on the dump, in which the gold or silver values are said to be low. Along the strike of this deposit, or S. 15° E., some stripping showed iron-stained rock and some mineralization, and it was claimed that this zone could be traced through a number of claims, but no work to demonstrate it was seen. Several hundred feet to the north, an 80-foot tunnel has been driven in along the limestone, but nothing was discovered.

Eight men were at work, and an 18-h.p. hoisting engine with vertical boiler, good gallow-frame, etc., were at the shaft.

*Simpson*.—South of the "Raven," 23-foot shaft showing some copper pyrites.

*Sandfly*, *Comet* and *Butterfly* have been located along the course of this supposed ledge, but little work, other than assessment work, has been done.

Mr. Johnson is developing a property 3 or 4 miles south of the "Raven," where he has discovered yellow copper ore, and on the "Cap-Sheaf" a shaft was being sunk on the same kind of ore, but lack of time forbade a visit to these claims.

#### KIRK LAKE GOLD MINES Co.

This company owns the *Victoria*, *Texada*, *Lindsay*, *Climax*, *Last Link*, *Crown-granted*, and the *Roy* and *Mill Site* mine locations, also 60 acres for millsite. Capital stock, \$600,000, in \$1 shares. President, D. R. Dingwell, Winnipeg; managing director, W. L. Challoner, Victoria.

On these claims are a number of small quartz veins in the dark green porphyritic rock, in the decomposed outcrops of some of which very fine specimens of free gold have been found. In depth, in the limited amount of work done, these veins are found to be irregular in width and to contain more or less sulphides and some gold in a gangue of quartz and country-rock, here altered to a fine-grained, greenish-grey mass along the fracture plane. On acquiring more funds, these claims will be further prospected and a small but efficient plant for hoisting and pumping will be put on the "Victoria." This property surrounds Kirk Lake (45 acres in extent), about the centre of the island, and is well timbered, and while trails radiate to different points, the road from the west coast will be continued from the "Lorindale" to this group.

*Victoria* has an inclined shaft, 102 feet deep (full of water), down on a quartz vein, 8 to 12 inches for most of this distance, strike east and west, and a cross-cut at the bottom, 26 feet to the south, towards a second vein 60 feet away. At the top of the shaft the rock taken out is seen to be this eruptive rock just described, more or less mineralized with iron pyrites and with quartz stringers, but very little quartz ore is on the dump. Along the surface this vein shows a decomposed, iron-stained rock, with free gold; but the unaltered material below is said not to assay high at all. The other vein, 4 to 20 inches wide, of white quartz, with a little iron and copper pyrites and traces of galena, can be traced for several hundred feet on the same east and west strike, but only a few shallow holes have been sunk.

*Texada*. In a small 10-foot hole, along a smooth wall, strike, S. 60° W., dip, S. 30°, E. 60°, is a brecciated mass, 6 to 10 inches wide, of quartz and the eruptive country-rock, with iron pyrites and sometimes specks of free gold—not traced for any distance, only seen on top of a small knoll.

*Lindsay*. On a knoll of porphyritic rock is another small vein, 4 to 10 inches wide, of brecciated quartz and greenstone, with copper and iron pyrites and traces of galena, strike, S. 60° W., traceable for a short distance, has a 10-foot hole. About 400 feet away is exposed another small vein of same character, running east and west.

*Water power* can be secured to a certain amount for part of the year by easily constructing a 15-foot dam at the outlet of Kirk Lake, where water carried in 3,000 feet of piping to the millsite will have a fall of 110 feet. Considerable work will have to be done before the value of these small veins can be determined or understood.

#### TIGER-LION.

On these two claims, south of the above group,, at a 35-foot shaft, full of water, a little ore or mixed quartz and greenstone, with copper pyrites, was seen on the dump.

#### NUT CRACKER-WARRIOR.

On these two claims, south-east of the Kirk Lake property, owned by Stanton and Evans, Nanaimo, there can be traced for 100 feet an east and west vein of the same brecciated mass of quartz and greenstone, 4 to 14 inches wide, carrying some sulphides and, it is said, free gold. A shaft, 18 feet deep, near the main trail.

#### LORINDALE.

On this claim, owned by a Victoria syndicate, Chas. Hayward, Secretary, some magnificent samples of free gold on the surface of a small quartz vein. These veins have been located, and on No. 1, a few inches wide, near N.E. corner-post, very little has been done. On No. 2 a tunnel (closed) was driven 70 feet along the vein, after which a shaft was sunk 46 feet at the mouth of this tunnel, where an assay of 60 ounces in silver had been got, and at the bottom it is said that there were 26 inches of bluish quartz, with copper and iron pyrites but low gold assays. The fine specimens were got from No. 3 vein, 60 feet south of No. 2, a vein 2 to 16 inches wide, of bluish quartz and fine-grained iron pyrites, traceable for over 400 feet. Many years ago a cut was run in on this vein and gold washed out of the decomposed material, but the present owners have only sunk a small 19-foot hole, where the vein is 6 to 16 inches wide of quartz and sulphides. No work was done during the past year. Log cabin and blacksmith shop. Timber good and plentiful. Very little water.

#### SILVER TIP.

The *Silver Tip*, *Alpha* and *Nancy Belle*, Crown grants applied for, lying about half a mile from Davis Bay, and over 700 feet above salt water, are bonded by the Texada Proprietary Co., Secretary, J. C. Keith, Vancouver. On the "Silver Tip" a shaft (full of water) had been sunk 141 feet, by using a horse-whim, and on the dump was seen some of the ore taken out, or the light coloured green stone, with a little quartz and galena, and iron and copper pyrites. At a lower point a new working shaft, 6 by 9 in the clear, was just begun, where the vein of quartz showed a few inches wide, but in the prospect shaft it is said there were 4 to 5 feet of this mineralized material. Mr. J. Findlay was in charge with 12 men, and machinery consisting of steam hoist, and a Knowles pump had been ordered. A road one and one-half miles long may be built to Davis Bay. Good cabins, good timber.

#### SURPRISE.

If more claims could be developed with the same economy and earnestness shown here by the party of eight Comox men, progress in mining affairs in British Columbia would advance much more satisfactorily. Here, these men banding together their interests and means and all working, are proving up their property after the manner that has made some of the Western Mining States famous, or by the simple method of talking little and doing much.

The *Surprise*, *Dude*, *Dundee* and *Comox Fractious*, owned by A. Jell *et al*, Van Anda P. O., lie south-east of the "Silver Tip," and on the Surprise, a shaft equipped with a horse-whim has been sunk 258 feet, along the line of fracturing that runs S. E. by N. W., and dips S. W. at an angle of 61 to 71 degrees, in fine-grained greenish feldspathic rock. Along this fissure the country-rock is shattered and more or less impregnated with quartz, copper and iron pyrites, and sometimes galena and blende. In places for several feet it is barren, then will succeed a mineralized body, from which assays from \$4 to \$34 in gold, silver and copper have been obtained, one such body 18 inches wide, carrying, Mr. Jell states, \$20 in value. At the 64 and 200-foot levels, short drifts run along the wall, showing some mineral, and at 250 feet a

drift was in 12 feet. This property is still a prospect, but encouraged by the fair assays obtained, work is being steadily advanced to see if ore-bodies of size can be found. The amount of copper is small, and as this will be smelting ore, the values must come mostly from the gold and silver contents.

A road two miles long runs to the coast at the Iron mine. Very little water makes in the shaft, easily handled by bucket. Cabins, etc., erected.

#### VICTORIA-TEXADA GOLD MINING COMPANY, LIMITED.

This company, capital stock \$1,500,000; Secretary, Beaumont Boggs, Victoria. On the west coast of the island, and on the Francis (?) claim, three veins were found in the compact, dark green amygdaloidal rock, at water level, on two of which the following work has been done.

*Vein No. 1* running north 80° east, dip vertical, has a tunnel 40 feet long. This vein is scantily defined in the face of the precipitous sea-wall, but at very low tide when the vein was washed, some fine samples of free gold were found. In this tunnel this vein is distinctly seen in the floor (washed clean by the high tides) to follow a line of fracture and shattering and to consist of bluish-white quartz with brecciated fragments of country-rock. The vein for most of its length is from 2 to 6 or 8 inches wide, with some copper and iron pyrites (but no free gold was seen), but in the face of the tunnel the width suddenly increases to 22 inches. A lot of this ore from near the surface was treated at the Victoria Metallurgical Works, and gave very good results in gold.

On *Vein No. 2* a short distance south of No. 1, a tunnel has been run in from a point 25 feet above high water, about 165 feet. At the beginning the vein is 8 to 12 inches wide of quartz with sulphides, and continues with a width of 2 to 4 inches for some distance along a smooth hanging wall, but beyond this is seen no more vein.

*Vein No. 3* of apparently nearly solid pyrites, about 2 feet wide, occurs in a small cove in the steep cliff-side, but no work has been done here. All work was suspended in November. Timber plentiful a short distance back from shore, but no water except the sea water.

#### GOLDEN SLIPPER.

This claim, the first Crown-granted on the Island, has yielded its owner, Mr. Miller, considerable gold where he has crushed and panned the decomposed surface material. Some work has been done on this lead itself, but it could not be examined as a hole at the entrance was full of water. A tunnel to tap the vein a little lower down was being run in by the owner.

#### OTHER CLAIMS.

On many other claims more or less work has been done where the conditions are much the same as described in the above claims, but they were not visited. Any such may be named the *Keystone*, *Mountain Chief*, *Tyhee* and *Whistler*, *Wanderer*, *X-Rays*, *Hidden Treasure*, *Genevieve*, *Daisy* and *Golden King*, *Palmerston*, *California*, *Olympia* and *Sheba*, *Minerva* and *Green*, *Cameron*, *Yellow Jacket*, *Monarch of the Glen*, *Nest Egg*, *Volunteer*, *Iron Duke*, etc.

#### IRON MINE (COPPER).

The Puget Sound Iron Co., have for many years held a large tract of land on this Island on which are the large deposits of magnetite found near the line of contact of the granitic and stratified rocks and limestone. A considerable amount of work has been done here, but no ore has been shipped for years, or nothing done since 1890, until recently the company determined to prospect where copper was showing in this ore. The superintendent, H. W. Lee, had sunk a shaft 56 feet and had a cross-cut in 14 feet, but while there were 4 to 5 tons of nearly solid copper pyrites on the dump, still the ore was being found in irregular bunches and stringers in the magnetite. No information was got of gold or silver contents, if any are present, and the water becoming too much to handle with windlass-bucket, work has been suspended. Should a deposit of pay ore be found here, a tunnel can be run in from near the shore and give a depth of 300 feet, and ore can be shipped from here when the wind is favourable.

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### REPORT BY MARSHALL BRAY, GOLD COMMISSIONER, NANAIMO, B. C.

"The information on mining operations for the past year is rather meagre, as, outside of Texada Island, very little actual development has been done, the large majority of the mineral claim owners having only done the necessary work to entitle them to hold their claims. The Yukon excitement acted as a set-back to prospecting and development last summer, and by present indications the excitement for those northern gold fields will retard development of the coast mineral claims during the coming season.

"This Mining Division was enlarged last summer by taking a slice from the New Westminster Mining Division, and another slice from the Victoria Mining Division in Coast District, and 132 records were transferred from the former, and 374 records from the latter, to this mining division.

"For the second year this mineral division has made a fair showing, as follows:—

Free Miner's Certificates issued . . . . .	710
Mineral claims recorded . . . . .	1,157
Certificates of work recorded . . . . .	287
Paid \$100 each in lieu of work recorded . . . . .	19
Certificates of improvement recorded . . . . .	14
Bills of sale of mineral claims recorded . . . . .	272
Grants of water-rights recorded . . . . .	3

Which gave a total revenue collected from the above for the year ending 31st of December, 1897, of \$10,025.25.

"367 records of mineral claims lapsed during the year of 1897, the work not having been recorded, and I still have 2,088 records in good standing on the 31st December, 1897. All these claims are along the coast line, or within easy reach of the coast, with the exception of those in Dunsmuir District, into which a waggon road was built last fall.

"The facility with which these mines can be operated and worked along the coast, owing to the cheapness of freight and supplies, the nearness of same to coal, coke, wood, flux, and in many places good water-power, will make them, when developed, good paying investments, and capitalists are just beginning to awaken to the possibilities of our coast mines, and quite a number of mineral claims have been purchased or bonded by them, and no doubt they will push development work on their holdings this coming season.

"The only mine that has shipped any ore of any amount from this district in 1897, is the "Van Anda" mine on Texada Island. They shipped 131 tons of rock to Swansea, and the same netted them \$1,625, on which they paid the mineral tax, this being the only mineral tax paid for 1897."

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### VANCOUVER ISLAND.

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During the past year a large amount of prospecting has been in progress at different points on the Island, more especially on the West Coast. Here the mountains contiguous to Barclay and Clayoquot Sounds and Sidney Inlet have been attracting much attention by the discovery of copper-bearing ore, upon some of which deposits considerable work is now in progress. A number of properties were sold in the proximity of Uchucklesit Harbour and Anderson Lake, where a company is beginning extensive explorations.

On the Sarita claims, little or no work has been done during the past year. On China Creek, work has ceased on the "Duke of York" placer claims, but prospecting is being done on the "Cataract" leases. Considerable work was done on the "Alberni Consolidated" quartz leads, and these claims have recently passed under the control of an English company. During the year, several lots of ore, aggregating 30 tons, were shipped out to be tested that yielded values of \$18.60 to \$39 in gold per ton, or an average of 1.57 ounces per ton. It is now very likely that vigorous work will soon be begun. The "Golden Eagle" is also being developed under the management of Mr. McQuillan.

The copper properties on the West Coast will now be, in many cases, carefully explored. Near Goldstream, locations have recently been made on deposits of copper ore, from which is got massive chalcopyrite, carrying low values in gold and silver. In November, a short visit was made to Mount Sicker.

#### MOUNT SICKER.

This mountain lies south of the Chemainus River, and is reached by road and trail about six miles long from Westholme Station on the E. and N. R., the trail crossing the summit at an elevation of 2,100 feet, and then dropping down to 1,650 feet, the elevation of the chief camp. A new line for a waggon road, with a steady grade has been cut so that it is now reported that this road running from near Somenos will make the distance 4 or 5 miles from the railroad up to the mines.

The mountain is well timbered, but the underbrush is not heavy so that the prospector has comparatively easy access to the many rock exposures. On this mountain the rock formation consists mostly of the greenish eruptives found on this Island, part of which here, without a decisive investigation, has evidently been altered into a very schistose, greyish rock. There appear to be small areas or inliers of very highly metamorphosed sedimentary rocks as well, but it is in these schists that the ore-bodies are found. A description of the following claims will give some idea of the conditions prevailing here, which certainly are very favourable.

On this claim, on the west slope of Mount Sicker, the owners, H. **Lenora.** Smith, H. Buzzard, *et al.*, have uncovered a large body of copper-bearing material, or a heavily mineralized zone, in one place 30 to 40 feet wide, with the typical "iron-copping," where there is an open cut, 5 feet wide, in a hard, fine-grained greenish rock heavily impregnated with fine-grained copper and iron pyrites. Here considerable solid sulphide ore is seen in this large exposure of gossany material, which has been traced farther up the hill to the "Tyee" claim, by shallow cuts and down the mountain about 100 feet to where a cross-cut tunnel has been run in 75 feet to intersect this ledge in its strike. This tunnel runs through a very quartzose schist, and crosses several small quartz veins carrying copper and iron pyrites, and near the face was a 30-inch vein of milky-white quartz with these pyrites, but the main ledge had not then been reached, although it is reported that, on since continuing it, a mass of copper-bearing material has been reached.

More extensive work will soon be begun on this property to develop this large showing of copper rock, which so far has proved to carry low values in gold and silver.

To the west, on the "Shakespeare," in a 10-foot tunnel, is a narrow vein of quartz and copper pyrites in the schists, and on the "Key City" is a small quartz vein, not traceable for any distance.

**Tyee.** This claim, lying immediately above and east of these out-croppings on the "Lenora," had had the ledge traced up to its boundary line, near which an 8 by 8-foot shaft was being sunk. This has since been sunk through 50 feet of barren, greyish rock, quite free of any signs of mineralization, but at this depth as an 18-foot cross-cut revealed nothing, it was decided to sink deeper, and in a few feet, it is now reported, a body of nearly solid chalcopyrite was struck, on a ledge 10 feet wide of the fine grained "yellow copper" ore with some quartz, and already a considerable amount of this ore has accumulated on the dump.

This claim is owned by Clemont Livingstone, *et al.*, Duncans.

On this claim lying north of the "Lenora" in the greyish schists, **Belle.** probably diabasic, is (a) a small vein, a few inches wide, of quartz and copper pyrites; (b) two very large quartz reefs about 100 feet apart in a solid dioritic rock, reefs 20 to 40 feet wide, of barren-looking milky-white quartz with no signs of any sulphides, and which have never been prospected or tested for gold; (c) another but small quartz ledge somewhat decomposed and iron-stained on which a little work has been done with no results or values in gold obtained. Located about 1,100 feet above the Chemainus River.

On the "Victoria" and "Susan," owned by P. J. Pearson, Chemainus, **Copper Canyon.** a tunnel had been started on the west bank of the Chemainus River, and 100 feet above it, and run south 35° west along a small quartz vein, 4 to 20 inches wide, of quartz and copper pyrites carrying some gold and silver. This vein lies almost conformably with the inclosing schists and, besides the vein exposed in the tunnel, a little work had disclosed some mineralized rock in two other places along the east bank.



There is a fine body of water in the Chemainus here, hence an excellent water-power, but no good trails have been cut out to reach this property that lies 1,100 feet below and west of the "Lenora."

A large number of claims have been staked off, some in small out-crops mineralized with a little copper and iron pyrites; others in those large leads of barren-looking untested quartz, but little or no work has been done upon them. The surface indications on those claims higher up the hill, as described, are certainly very good, and these claims should be carefully prospected, but until they are, it will be futile to even consider the shipment of ore for some time to come, or until a good amount is in sight. It will not be at all difficult to find the average values in this ore by careful sorting, sampling and assaying, and if work shows up good bodies of pay ore here, the means of transport can be provided.

This section lies within the boundaries of the E. & N. R. land grant, and titles to these claims, with rights to all metals found upon them, can be obtained on purchase.

#### GOLDSTREAM.

During the past autumn attention has been drawn to Mount Skirt, near Goldstream, eleven miles from Victoria, where work has been in progress on the claims of the Ralph Mining Company, Registered. On five claims, the "Ralph," "Lubbe," "Phair," "Tolmie" and "Mt. Skirt," about a mile from the station on the E. & N. R., work has been done on the "Ralph" where, in a very highly altered rock, probably eruptive, have been found out-crops impregnated with some chalcopyrites. In one open cut were seen 7 to 8 feet of mixed, but low grade material also showing in some other small openings, but in a shaft 25 feet deep a shute of solid "yellow copper" ore, from 6 inches to 3 feet thick, had been followed down for about 15 feet, ore that assayed from 18 to 25% copper, 1 dwt. of gold, and 5 to 8 ounces of silver per ton. A cross-cut had been run in from the bottom of the shaft for about 15 feet, only exposing a little metallic copper along the faces in the slate-like rock. Considerable work will be done here, but it is yet too early to determine what these surface showings may lead to in depth.

#### VICTORIA DISTRICT.

##### VICTORIA DIVISION—W. S. GORE, GOLD COMMISSIONER.

"Notwithstanding the transfer, in the early part of the year, of one of the principal mining localities, viz.: Phillips Arm and vicinity, from this to the Nanaimo Division, the records issued at this office still show an increase of over double the number of the previous year.

"The revenue derived from this source shows an increase of nearly \$10,000:—

	1896.	1897.
No. of Free Miners Certificates issued.....	690	1,204
" Mineral claims recorded.....	342	772
" Placer ".....	25	15
" Certificates of work.....	60	67
" Certificates of Improvement.....	1	6
" Grants of Water Right.....	13	11
" Lay overs.....	11	6
" Placer leases.....	22	34
" Conveyances.....	83	130
" Mill site leases.....		1

#### REVENUE DERIVED.

	1896.	1897.
From Free Miners Licences.....	\$3,460	\$11,402
" Mining receipts, general.....	3,117 10	4,359 60
	<u>\$6,577 10</u>	<u>\$15,761 60</u>

"Considerable interest is being taken in the development of the claims on Mount Sicker and those on the San Juan and Gordon Rivers, at which places the work during the past season has proved very satisfactory to the owners.

"I append to this report a complete list of the Gold Commissioners and Mining Recorders for the Province corrected to date; also a list of mineral claims Crown-granted during 1897."

## CROWN GRANTS ISSUED FOR MINERAL CLAIMS DURING 1897.

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## ALBERNI.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Ace of Spades .....	Alberni .....	Elizabeth J. Saunders .....	48.86	Section 215 ..	Feb'y 1st, 1897
Alberni .....	" .....	Alberni Con. G. M. Co., Ltd.	48.21	" 206 ..	" 17th, "
Champion .....	" .....	G. Brown and G. A. Kirk ..	51.65	" 217 ..	" 2nd, "
Chicago .....	" .....	Con. Alberni G. M. Co., Ltd.	51.65	" 207 ..	" 17th, "
Last Dollar .....	" .....	Elizabeth J. Saunders .....	29.76	" 216 ..	" 1st, "
Minnie .....	" .....	" .....	"	" 43 ..	" 1st, "
Missing Link .....	" .....	G. Brown and G. A. Kirk ..	"	" 214 ..	" 2nd, "
Star of the West .....	" .....	G. Brown, F. P. Saunders, M. A. Ward & F. H. Stirling.	49.55	" 40 ..	Mar. 19th, "
Victoria .....	" .....	Con. Alberni G. M. Co., Ltd.	48.21	" 205 ..	Feb. 17th, "
Warspite .....	" .....	" .....	51.65	" 208 ..	" 17th, "

## EAST KOOTENAY.

Allover .....	Fort Steele ..	C. D. Porter .....	32.75	Lot 1384, G. 1	July 22nd, 1897
Dean .....	" .....	" .....	47.9	" 1382 "	" 22nd, "
Hidden Treasure .....	Golden .....	T. Jones and W. McNeish ..	39.30	" 1108 "	Jan. 30th, "
Loretta .....	Fort Steele ..	J. Cronin and J. A. Finch ..	11.60	" 667 "	Mar. 10th, "
Moyie .....	" .....	F. Houghton and E. P. Davis	50.12	" 669 "	Feb. 9th, "
Peter .....	" .....	J. Cronin and J. A. Finch ..	51.65	" 665 "	Mar. 10th, "
Queen of the Hills .....	" .....	F. Houghton and E. P. Davis	50.18	" 668 "	Feb. 9th, "
Rose Fraction .....	" .....	J. Cronin and J. A. Finch ..	2.10	" 1380 "	Mar. 11th, "
St. Eugene .....	" .....	" .....	51.30	" 666 "	" 10th, "

## WEST KOOTENAY.

Argentine .....	Trail Creek ..	W. A. Ritchie .....	29.00	Lot 1507, G. 1	Mar. 22nd, 1897
Abe Lincoln No. 1 .....	" .....	Abe Lincoln G. M. Co. ....	18.17	" 1296 "	April 6th, "
Alta .....	Slocan .....	W. Braden .....	47.69	" 853 "	" 8th, "
Alpha .....	Trout Lake ..	Lillooet, Fraser R. & Cariboo Gold Fields, Ltd. ....	31.16	" 1553 "	May 10th, "
Argenta .....	Slocan .....	F. A. Henneberg & W. C. Price	51.65	" 1412 "	June 8th, "
Anaconda .....	Trail Creek ..	G. Pellens <i>et al</i> .....	8.79	" 934 "	July 21st, "
Alf .....	" .....	Alfe G. M. Co., Ld .....	34.65	" 1506 "	Aug. 5th, "
American Boy .....	Slocan .....	Eva Boss <i>et al</i> .....	8.18	" 571 "	July 30th, "
Adela .....	" .....	W. Thomlinson <i>et al</i> ..	48.75	" 1535 "	Oct. 6th, "
Antoine .....	" .....	Alex. Green and Smith ..	14.12	" 516 "	Nov. 16th, "
Annie E .....	Trail Creek ..	British Lion Mining Co. ....	11.49	" 1457 "	" 16th, "
Annie .....	Illecillewaet ..	Lillooet, Fraser R. & Cariboo Gold Fields, Ld. ....	24.2	" 1590 "	" 16th, "
Albany .....	Trail .....	Wm. Brown <i>et al</i> .....	42.68	" 1636 "	" 16th, "
Alpha .....	Goat River ..	Geo. Alexander .....	40.07	" 1387 "	Dec. 17th, "
Atwood .....	Trail .....	B. C. Gold Discovery Co. (foreign) .....	26.88	" 1231 "	Jan. 13th, 1898
Blue Elephant .....	Trail Creek ..	Rochester G. M. Co. ....	51.47	" 1280 "	" 18th, 1897
Butte .....	" .....	Butte Gold-Copper M. Co (fn)	25.17	" 1148 "	" 28th, "
Badger .....	" .....	J. Lineham and R. F. Dodd ..	32.76	" 1227 "	" 28th, "
Black Horse .....	" .....	W. J. Harris .....	20.31	" 1059 "	July 22nd, "
Boice .....	" .....	Imperial G. M. Co. ....	29.07	" 1340 "	May 7th, "
Broadview .....	Trout Lake ..	Lillooet, Fraser R. & Cariboo Gold Fields, Ld. ....	48.16	" 1550 "	" 10th, "
Buckeye .....	Trail Creek ..	S. J. Graham <i>et al</i> .....	51.65	" 1517 "	" 11th, "

## WEST KOOTENAY.—Continued.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Bolder.....	Trail Creek..	J. J. Henager <i>et al.</i> .....	37.91	Lot 1631, G. 1	May 12th, 1897
Black Rock .....	" .....	Black Rock M. Co. (foreign)	23.74	" 1821 "	July 28th, "
Blue Grouse .....	Slocan .....	Sword & White .....	47.45	" 1846 "	Aug. 5th, "
Bellevue .....	Trail Creek ..	A. A. McKenzie <i>et al.</i> .....	46.84	" 1137 "	Sept. 2nd, "
Belcher .....	" .....	F. Guse <i>et al.</i> .....	33.24	" 1951 "	" 24th, "
Budwiser No. 2 .....	Ainsworth ..	Can. Pac. M. and M. Co. ....	31.00	" 714 "	Oct. 1st, "
Bryan .....	Trail Creek..	J. A. Forin and J. W. Boyd	23.23	" 1827 "	" 23rd, "
Bryan No. 4 .....	Slocan .....	J. McNeill .....	44.00	" 1581 "	Nov. 16th, "
Beaver .....	" .....	W. Kootenay Exp. & M. Co.	29.6	" 1807 "	" 16th, "
Bounty .....	Ainsworth ..	P. E. Fisher .....	32.39	" 2322 "	Dec. 17th, "
Blue Jay .....	Slocan .....	E. H. Tomlinson and W. A. Hendry	17.57	" 594 "	" 15th, "
Belle .....	Nelson .....	J. A. Coryell, Alex. Goyette and J. A. Quinlan .....	42.00	" 2461 "	Jan. 28th, 1898
Bonanza King .....	Slocan .....	Noble 5 Con. M. & M. Co. (foreign)	13.62	" 465 "	Dec. 15th, 1897
Cleopatra .....	Nelson .....	A. H. Kelly .....	42.74	" 387 "	Jan. 6th, "
Celtic Queen .....	Trail Creek..	J. F. Herrick .....	50.30	" 987 "	" 15th, "
Centre Star No. 2 .....	" .....	Rossland Star G. M. Co., Ltd.	21.68	" 1346 "	" 28th, "
Campbird .....	" .....	G. E. Wilson .....	23.23	" 1283 "	Feb'y 16th, "
Consolation .....	" .....	" .....	46.16	" 1282 "	" 16th, "
Corinth .....	Slocan .....	Jas. Gilhooly .....	25.00	" 1264 "	" 18th, "
Christine .....	Trail Creek..	J. L. Warner & A. W. Provand	15.58	" 1219 "	Mar. 12th, "
Curlew .....	" .....	Jno. Earle & Jos. Vogel .....	34.48	" 1220 "	" 16th, "
Copper Jack .....	" .....	Trail Creek M. Co. (foreign).	20.94	" 1185 "	" 22nd, "
Cambridge .....	" .....	Jno. Elliott <i>et al.</i> .....	25.08	" 1224 "	April 12th, "
Carnation .....	Slocan .....	Donald D. Mann .....	39.96	" 575 "	" 15th, "
Comet .....	Trail Creek..	D. R. McDonald .....	38.9	" 1516 "	May 8th, "
Cutter Fraction .....	Trout Lake..	Lillooet, Fraser R. & Cariboo Gold Fields, Ltd .....	3.73	" 1554 "	" 10th, "
Clipper Fraction. ....	" .....	Lillooet, Fraser R. & Cariboo Gold Fields, Ltd .....	2.37	" 1555 "	" 10th, "
Curley .....	Slocan .....	E. McNicholl <i>et al.</i> .....	23.99	" 1335 "	June 4th, "
Cariboo .....	Trail Creek..	D. McDermid and J. Dean ..	34.96	" 1639 "	July 22nd, "
Captain No. 3 .....	" .....	A. D. Provand .....	23.64	" 1289 "	" 27th, "
Campbell .....	" .....	Chas. Tetley .....	26.74	" 1621 "	" 23rd, "
Cariboo .....	Slocan .....	Rambler & Cariboo G. M. Co.	16.14	" 720 "	" 31st, "
California .....	" .....	A. J. Merks <i>et al.</i> .....	37.87	" 918 "	Sept. 10th, "
Colonial .....	Illecillewaet.	Lillooet, Fraser R. & Cariboo Gold Fields, Ltd .....	38.25	" 1589 "	" 8th, "
Copper Glance .....	" .....	Lineham & Dodd .....	44.37	" 1496 "	" 9th, "
Columbus .....	Trail Creek..	David M. Shaw .....	38.12	" 1671 "	" 24th, "
Chicora .....	Nelson .....	Montreal & B. C. Prospecting and P. Co., Ltd .....	22.00	" 364 "	Oct. 7th, "
Crazy Horse .....	Trail Creek..	Stack & McDonell .....	4.38	" 1958 "	" 13th, "
C. B. & Q. ....	" .....	A. T. Monteith .....	50.8	" 1188 "	" 23rd, "
Columbus .....	Slocan .....	Wonderful Group M. Co. ....	51.65	" 1309 "	" 22nd, "
Coxey .....	Trail Creek..	J. R. Cook and E. Johnson ..	40.85	" 1221 "	Nov. 16th, "
Cazabazua .....	Slocan .....	W. K. (B. C.) Exp. & M. Co.	34.22	" 1528 "	" 16th, "
Celebration .....	Ainsworth ..	Columbia Min. Co., Vic. B.C.	41.21	" 1414 "	Dec. 2nd, "
Climax .....	Slocan .....	R. Winegate <i>et al.</i> .....	16.02	" 1846A "	" 3rd, "
Charlton .....	Trail .....	A. Jackson and J. Johnston ..	12.62	" 975 "	" 2nd, "
Cold Blow .....	Slocan City..	F. S. Andrews .....	51.65	" 2218 "	" 17th, "
Charleston .....	Ainsworth ..	R. F. Green .....	19.75	" 2321 "	" 16th, "
Deadwood .....	Trail Creek..	C. W. Callahan .....	51.65	" 1291 "	Jan. 7th, "
Delacola .....	" .....	Delacola G. M. Co., Ltd .....	21.72	" 1502 "	Feb'y 12th, "
Dorothy .....	Illecillewaet.	Lanark Con. M. & Smelting Co., Ltd .....	51.65	" 1559 "	Aug. 6th, "
Duluth .....	Slocan .....	P. M. Hayes & M. R. Rathburn	31.00	" 1019 "	April 30th, "
Daydawn .....	" .....	F. Steele and S. B. Steele ..	12.9	" 596 "	" 5th, "
Dragon .....	" .....	Wm. Braden .....	35.77	" 848 "	" 14th, "
Detroit Fraction .....	Trail Creek..	Laura Hornshaw .....	26.55	" 1192 "	May 14th, "
Day Dawn Fraction .....	Slocan .....	M. C. Monaghan .....	7.02	" 598 "	" 11th, "
Derby .....	Trail Creek..	P. Aspinwall .....	48.21	" 998 "	" 27th, "
Dublin Queen .....	Ainsworth ..	The Jackson Mines, Ltd. ....	51.65	" 1167 "	Aug. 4th, "
Despair .....	Slocan .....	H. W. Foster <i>et al.</i> .....	25.25	" 840 "	" 17th, "
Democrat .....	" .....	W. B. Cash and J. G. Steel ..	51.65	" 1250 "	Nov. 28th, "

## WEST KOOTENAY.—Continued.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Dexter .....	Nelson .....	A. C. Flumerfelt .....	51.50	Lot 2012 G. 1	Dec. 2nd, 1897
Dexter Fraction .....	" .....	" .....	4.66	" 2013 "	" 2nd, "
Exchequer .....	" .....	A. H. Kelly .....	31.59	" 391 "	Jan. 7th, "
Empress .....	Trail Creek .....	J. T. Bethune, A. J. McLellan and H. A. Munn .....	39.54	" 991 "	Mar. 15th, "
Eden .....	" .....	W. M. Newton <i>et al.</i> .....	30.96	" 1127 "	" 16th, "
Emma .....	Slocan .....	Byron N. White Co (foreign) .....	10.65	" 1009 "	" 23rd, "
Ephraim Fraction .....	" .....	Reco M. & Milling Co., Ltd. .....	6.17	" 600 "	April 7th, "
Emerald .....	Trail Creek .....	Hirschel Cohen .....	22.44	" 949 "	" 5th, "
Eureka No. 1 .....	" .....	The Old Flag G. M. Co., Ltd. .....	51.65	" 1136 "	" 6th, "
Enterprise .....	Slocan .....	J. A. Finch .....	44.39	" 1014 "	May 4th, "
Elba .....	Trail Creek .....	David Barr .....	40.67	" 1614 "	" 31st, "
East St. Louis .....	" .....	E. St. Louis G. M. Co., Ltd. .....	33.00	" 1641 "	June 28th, "
Ego .....	" .....	D. B. Dewar .....	39.02	" 1823 "	Aug. 4th, "
Ettie .....	" .....	Charles Tetley .....	49.12	" 1622 "	July 23rd, "
Elise .....	Nelson .....	Elise G. M. Co. ....	28.89	" 1310 "	Aug. 5th, "
Eureka .....	" .....	Montreal & B. C. Prospecting & Promoting Co., Ltd. ....	48.00	" 399 "	Oct. 7th, "
Easter .....	Ainsworth .....	R. E. Lee Brown .....	35.2	" 1427 "	Nov. 16th, "
Empire No. 5 .....	Slocan .....	J. McNeill & C. A. Holland .....	41.04	" 1580 "	" 16th, "
Emerald Hill .....	Ainsworth .....	R. E. Brown & E. Ewart .....	35.77	" 1426 "	Dec. 14th, "
Falu .....	Trail Creek .....	Eastern G. M. Co. (foreign) .....	49.13	" 1350 "	Feb'y 16th, "
Florence .....	" .....	Adelia Stussie <i>et al.</i> .....	51.21	" 1354 "	April 9th, "
Flossie L. ....	" .....	Cyrus Happy .....	10.86	" 1301 "	May 4th, "
Fairview .....	" .....	Fairview G. M. Co. ....	37.63	" 1058 "	July 16th, "
Florian Fraction .....	Illecillewaet .....	Lillooet, F. R. & Cariboo G. F., Ltd. ....	39.6	" 1591 "	Nov. 26th, "
Fresno .....	Ainsworth .....	R. E. Lee Brown .....	8.35	" 1423 "	" 16th, "
Grover .....	Slocan .....	C. W. Callahan .....	47.1	" 1330 "	Jan. 17th, "
Golden Dawn .....	Trail Creek .....	C. Glass & T. R. Morrow .....	44.85	" 1349 "	Mar. 1st, "
Golden Horn .....	" .....	A. D. Provand .....	17.86	" 1234 "	" 4th, "
Galena .....	Slocan .....	W. A. Hendryx, G. A. Kirk & C. A. Holland .....	10.18	" 593 "	" 11th, "
Gold Star .....	Trail Creek .....	V. D. Williamson & J. L. Campbell .....	49.42	" 1191 "	April 8th, "
Gopher .....	" .....	Gopher G. M. Co. ....	18.60	" 1050 "	May 4th, "
Golden Horn .....	Nelson .....	J. Pitre .....	29.5	" 1711 "	" 5th, "
Gold Queen .....	Trail Creek .....	Gold Queen M. & R. Co. ....	47.66	" 1352 "	" 10th, "
Green Mountain .....	" .....	H. E. Lowry & J. B. McArthur .....	42.00	" 638 "	July 21st, "
Gold Bug No. 2 .....	" .....	M. R. Galusha <i>et al.</i> .....	17.3	" 1154 "	" 27th, "
Goldie .....	" .....	Goldie Rene M. Co. ....	28.08	" 1759 "	" 27th, "
Goulah .....	" .....	H. L. A. Kellar <i>et al.</i> .....	39.24	" 1452 "	Sept. 8th, "
Green Horn .....	Slocan .....	J. & D. McNeill .....	11.21	" 1306 "	" 24th, "
Goodenough .....	Nelson .....	G. H. Andrews .....	18.4	" 392 "	Nov. 16th, "
Good Friday .....	Trail Creek .....	H. Pahl & Toklas .....	48.45	" 967 "	" 16th, "
Golden Butterfly .....	" .....	A. D. Provand .....	42.99	" 1217 "	" 16th, "
Golden Eagle .....	Slocan .....	A. C. Flummerfelt .....	46.92	" 1845A "	" 16th, "
Helen No. 2 .....	Trail Creek .....	W. J. C. Wakefield .....	43.21	" 1151 "	Jan. 18th, "
Hoper .....	Illecillewaet .....	Lanark Con. M. & S. Co., Ltd. ....	51.65	" 1558 "	Aug. 6th, "
Home Fraction .....	" .....	Lillooet, F. R. & Cariboo G. F., Ltd. ....	19.4	" 1561 "	" 6th, "
Hard Bargain .....	Trail Creek .....	Hope, Johnson <i>et al.</i> .....	30.11	" 1129 "	April 28th, "
Highland .....	Slocan .....	J. McClements <i>et al.</i> .....	32.02	" 1337 "	June 4th, "
Hidden Treasure .....	Trail Creek .....	War Eagle Con. M. Co. ....	43.36	" 930 "	Sept. 3rd, "
Hope .....	Slocan .....	H. W. Forster <i>et al.</i> .....	39.00	" 840 "	Aug. 17th, "
Hidden Treasure .....	Nelson .....	Montreal & B. C. P. & P. Co., Ltd. ....	51.65	" 503 "	Oct. 6th, "
" .....	Slocan .....	Geo. Alexander .....	15.29	" 1715 "	" 6th, "
Hazel C .....	Ainsworth .....	R. E. Lee Brown .....	28.9	" 691 "	Nov. 16th, "
Irene .....	" .....	J. C. Eaton .....	29.54	" 1171 "	Jan. 8th, "
Iron Queen No. 1 .....	Trail Creek .....	J. J. Kingsmill .....	37.58	" 1504 "	" 26th, "
Independent .....	" .....	Independent M. Co., Ltd. ....	17.16	" 1275 "	Feb'y 12th, "
Iron Colt .....	" .....	P. Burns & W. A. Campbell .....	16.20	" 796 "	Mar. 20th, "
Imperial Fraction .....	" .....	Imperial G. M. Co. ....	17.23	" 1341 "	May 7th, "
Idler .....	Slocan .....	Idler M. Co. ....	27.45	" 857 "	April 29th, "
Ibex .....	Trail Creek .....	Ibex M. Co., Ltd. ....	20.13	" 1618 "	May 13th, "
Isabella .....	Revelstoke .....	Lanark Con. M. & S. Co., Ltd. ....	48.00	" 1557 "	June 2nd, "

## WEST KOOTENAY.—Continued.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Ivanhoe No. 3.....	Trail Creek	J. H. Adams .....	39.12	Lot 1629 G. 1	July 23rd, 1897
Idaho No. 2.....	Slocan .....	J. B. McArthur <i>et al.</i> .....	31.33	" 1013 "	Aug. 5th, "
Isabella No. 2.....	Trail Creek	Nanaimo & Rossland M. Co. .	44.21	" 1355 "	Sept. 23rd, "
Illinois .....	Ainsworth ..	P. E. Fisher .....	20.66	" 2327 "	Dec. 17th, "
Ivanhoe No. 2.....	" .....	M. Stevenson & G. Rumpf .	13.11	" 603 "	" 16th, "
Jennie .....	Slocan .....	B. N. White Co. ....	5.34	" 546 "	Mar. 23rd, "
John Plummer Fraction	" .....	Wm. Braden .....	5.12	" 851 "	April 29th, "
Juliet .....	Trail Creek	English-Can. G. M. Co., Ltd.	51.65	" 1620 "	July 28th, "
Joker .....	" .....	W. Claffy <i>et al.</i> .....	17.07	" 1690 "	April 29th, "
Jennie No. 3.....	Slocan .....	J. A. McDonell .....	23.10	" 1713 "	May 14th, "
June .....	Trail Creek	A. D. Provand .....	42.97	" 1216 "	July 27th, "
Jersey .....	" .....	J. M. Harris <i>et al.</i> .....	42.22	" 646 "	Sept. 28th, "
Jo-Jo .....	" .....	C. Dawson <i>et al.</i> .....	28.76	" 1160 "	" 30th, "
Jenny Lind .....	Slocan .....	W. K. (B. C.) E. & M. Co., Ltd	41.26	" 1806 "	Nov. 26th, "
Kaslo .....	Ainsworth ..	G. Alexander <i>et al.</i> .....	50.56	" 822 "	May 26th, "
Kate .....	Slocan .....	C. W. Callahan .....	51.65	" 1333 "	Jan. 7th, "
Knight Templar.....	Trail Creek	W. J. C. Wakefield .....	51.65	" 1155 "	Feb'y 10th, "
Kootenay Star .....	Ainsworth ..	The Jackson Mines, Ltd. ....	36.80	" 1168 "	Aug. 4th, "
Keivi .....	Trail Creek	H. L. A. Kellar <i>et al.</i> .....	35.39	" 1450 "	Sept. 8th, "
Kootenay Fraction .....	" .....	Trail Mining Co. ....	.10	" 1198 "	Oct. 4th, "
Knoxville .....	Slocan .....	Noble Five Con. M. & M. Co	11.72	" 466 "	Dec. 15th, "
Lanark .....	Illecillewaet.	Lanark Con. M. & S. Co., Ltd	8.00	" 1592 "	June 2nd, "
			37.65	" 1592A "	
La Regina .....	Trail Creek	La Regina G. M. Co. ....	19.28	" 1128 "	Feb'y 12th, "
Lucetta .....	Slocan .....	Noble Five Con. M. & M. Co.	2.77	" 599 "	Mar. 11th, "
Lookout No. 2.....	" .....	Wonderful Group M. Co. ....	44.31	" 1308 "	April 7th, "
Lucky Jim .....	" .....	Wm. Braden .....	29.94	" 844 "	" 12th, "
Lone Jack .....	Trail Creek	Silver Bell M. Co., Ltd. ....	39.23	" 1619 "	May 11th, "
London .....	Slocan .....	London Hill M. & Dev. Co. .	47.29	" 1416 "	" 17th, "
Little Dalles .....	Trail Creek	A. D. Provand .....	6.74	" 1215 "	June 4th, "
Little Darling.....	" .....	Cyrus Happy .....	25.00	" 1043 "	July 28th, "
Lone Star .....	Slocan .....	J. W. Sword <i>et al.</i> .....	51.60	" 1844 "	Aug. 5th, "
Livingstone .....	Trail Creek	E. R. C. Clarkson .....	9.6	" 1500 "	July 30th, "
Louise .....	" .....	Nanaimo-Rossland M. Co., Ltd	41.01	" 1642 "	Sept. 9th, "
Little Dot .....	" .....	Roberts & Phillips .....	49.35	" 1356 "	" 23rd, "
Little Joe .....	" .....	E. S. Topping <i>et al.</i> .....	38.88	" 1695 "	Oct. 5th, "
Last Link .....	Ainsworth ..	R. E. Lee Brown .....	3.27	" 1425 "	Nov. 16th, "
Lincoln .....	" .....	Columbia M. Co. ....	40.09	" 1413 "	" 16th, "
Lighthart .....	Nelson .....	Dundee G. M. Co. ....	46.2	" 1862 "	" 26th, "
Maid of Erin.....	Trail Creek	R. E. Lee G. M. Co. ....	32.35	" 1293 "	Jan. 18th, "
Mary May .....	" .....	A. E. Fritsh .....	51.65	" 1492 "	Feb'y 16th, "
Marion .....	" .....	B. C. Syn., Ltd., & J. L. Mulroney .....	31.38	" 1286 "	" 11th, "
Maple Leaf .....	Illecillewaet.	Lillooet, F. R. & Cariboo G. F., Ltd .....	21.65	" 1562 "	Aug. 6th, "
Miartonoimali .....	Slocan .....	James Gilhooly .....	40.3	" 1461 "	Feb'y 19th, "
Mascott .....	Trail Creek	Big Three G. M. Co. ....	43.53	" 1341 "	" 22nd, "
Mabel .....	" .....	W. A. Ritchie .....	9.4	" 1202 "	Mar. 10th, "
Midnight .....	" .....	Provand & Warner .....	43.63	" 1186 "	" 12th, "
Maud S. ....	" .....	B. A. True, C. B. Etnier & David Cromie .....	24.5	" 1442 "	April 7th, "
Moses .....	Slocan .....	Wm. Braden .....	27.06	" 856 "	" 15th, "
Mugwump .....	Nelson .....	Oliver Blair .....	34.8	" 1714 "	May. 5th, "
Madison .....	Slocan .....	Wm. C. Price .....	50.03	" 1411 "	June 8th, "
Mardon Fractional .....	" .....	F. A. Henneberg & W. C. Price	.90	" 1420 "	" 8th, "
Minnie .....	Trail Creek	J. P. Graves <i>et al.</i> .....	32.75	" 1610 "	July 31st, "
Marie .....	" .....	D. F. Johnston .....	51.65	" 1518 "	" 27th, "
Mocking Bird .....	" .....	D. F. Johnston & J. T. Johnston	41.34	" 1766 "	" 30th, "
Mayflower No. 2.....	" .....	J. Coates .....	44.50	" 1274 "	Aug. 5th, "
Minniapolis .....	Slocan .....	Erie M. & M. Co., Ltd .....	48.5	" 578 "	" 5th, "
Mother Lode .....	Trail Creek	Richard Daniel <i>et al.</i> .....	30.00	" 1764 "	Sept. 17th, "
Mountain Chief .....	" .....	Dickson & McRae .....	36.3	" 1515 "	Oct. 6th, "
Millsite .....	" .....	Thos. J. Lendrum .....	5.00	" 592 "	" 6th, "
March .....	Slocan .....	Van. & B. C. Gen. Exp. Co., Ltd	48.80	" 1392 "	Nov. 26th, "
Mascot Fraction.....	Trail Creek	Mascot G. M. Co., Ltd .....	15.36	" 1298 "	" 26th, "
Maud S. ....	Ainsworth ..	R. E. Lee Brown .....	50.5	" 1422 "	" 26th, "

## WEST KOOTENAY.—Continued.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Minnie Moore No. 1...	Trail .....	M. A. L. Archer & P. W. Peterson .....	49.25	Lot 1791, G. 1	Dec. 15th, 1897
Maud E. ....	Slocan .....	Noble Five Con. M. & M. Co	15.45	" 463 "	" 15th, "
Magog .....	Goat River .....	Geo. Alexander .....	49.1	" 1586 "	" 17th, "
Mary Farley .....	Trail .....	J. J. Kearns <i>et al.</i> .....	27.65	" 1702 "	" 17th, "
North Star No. 3 .....	Trail Creek .....	Rossland Star G. M. Co., Ltd.	26.49	" 1345 "	Jan. 28th, "
Norway .....	" .....	L. J. McAlee & W. F. Case ..	51.65	" 1501 "	April 6th, "
Norway .....	" .....	Bruce G. M. Co. ....	43.25	" 1628 "	April 6th, "
Nicolet .....	Ainsworth .....	J. Thompson, Jr. ....	18.55	" 602 "	" 9th, "
Neptune .....	Trail Creek .....	W. D. McFadden & D. O'Sullivan .....	37.1	" 1495 "	May 6th, "
Noonday .....	Slocan .....	C. McNicholl <i>et al.</i> .....	51.65	" 1334 "	June 4th, "
Northern Bell .....	Ainsworth .....	The Jackson Mines, Ltd .....	51.65	" 1166 "	" 4th, "
Noble Three .....	" .....	Noble Three M. & M. Co., Ltd	28.52	" 1435 "	Oct. 14th, "
Nancy Hanks .....	" .....	R. E. Lee Brown .....	7.66	" 1421 "	Nov. 26th, "
Nevada .....	Trail Creek .....	Hy. Stoll & Rugh .....	33.67	" 966 "	Dec. 4th, "
Noble Five .....	Slocan .....	Noble Five Con. M. & M. Co	10.56	" 467 "	" 15th, "
Orizaba .....	Trail Creek .....	W. J. C. Wakefield .....	42.1	" 1153 "	Feb. 9th, "
Oak Leaf .....	Illecillewaet .....	Lillooet, F. R. & Cariboo G. F. Ltd. ....	36.00	" 1563 "	Aug. 7th, "
Old Sonoma .....	Trout Lake .....	Lillooet, F. R. & Cariboo G. F., Ltd .....	10.09	" 1551 "	May 10th, "
Ottawa No. 1 .....	Trail Creek .....	A. E. Osler .....	43.18	" 1193 "	June 3rd, "
Opher .....	Ainsworth .....	The Jackson Mines, Ltd .....	35.71	" 1169 "	Aug. 4th, "
Old Hundred .....	Trail Creek .....	G. R. Hamilton .....	14.45	" 1617 "	July 28th, "
Okanagan .....	Slocan .....	Dardanelles M. & M. Co., Ltd	45.44	" 454 "	Nov. 16th, "
Ottawa No. 2 .....	" .....	W. K. (B. C.) Exp. & M. Co., Ltd .....	35.20	" 1805 "	" 16th, "
Oro Fino .....	Nelson .....	A. C. Flumerfelt .....	38.70	" 2011 "	Dec. 2nd, "
Old Bill .....	" .....	Dundee G. M. Co., Ltd .....	51.65	" 1863 "	" 2nd, "
Peerless (Revised) .....	Slocan .....	C. W. Callahan .....	31.38	" 1332 "	Jan. 7th, "
Phoenix (Revised) .....	Trail Creek .....	W. J. C. Wakefield .....	20.79	" 1152 "	Feb. 9th, "
Pug .....	" .....	Columbia & Ontario G. M. Co	30.16	" 1363 "	Aug. 4th, "
Phroso .....	Slocan .....	Wm. Braden .....	19.61	" 1363A "	
Prince of Wales .....	Trail Creek .....	J. McMartin .....	41.51	" 852 "	April 8th, "
Phillipsburg .....	Trout Lake .....	Lillooet, F. R. & Cariboo G. F., Ltd .....	51.00	" 1625 "	May 7th, "
Portland .....	Trail Creek .....	Portland G. M. Co. ....	26.76	" 1552 "	" 10th, "
Pacific .....	Slocan .....	F. & S. B. Steele .....	51.65	" 1445 "	" 11th, "
Pirate .....	" .....	T. Marks .....	1.10	" 597 "	" 8th, "
Peak .....	Trail Creek .....	M. E. Raummelmeyer & F. W. Hunt .....	44.60	" 1304 "	" 25th, "
Purcell .....	Slocan .....	Purcell Min. Corporation, Ltd	9.69	" 1209 "	July 28th, "
Poor Property .....	Trail Creek .....	J. Quilliam & H. S. Wadsworth	13.62	" 849 "	Aug. 25th, "
Parker .....	Nelson .....	Dundee G. M. Co. ....	50.45	" 1273 "	Sept. 24th, "
Queen's Own .....	Trail Creek .....	J. A. Kirk .....	51.65	" 1861 "	Nov. 26th, "
Read .....	Slocan .....	E. E. Evans .....	19.82	" 1616 "	May 8th, "
Robert E. Lee .....	Slocan .....	R. E. Lee G. M. Co. ....	22.70	" 1247 "	Jan. 14th, "
Rob Roy .....	Trail Creek .....	R. E. Lee G. M. Co. ....	51.65	" 1292 "	" 18th, "
Red Fox .....	" .....	B. C. Syndicate .....	18.44	" 1290 "	Feb. 11th, "
Red Point .....	Illecillewaet .....	Lanark Con. M. & S. Co., Ltd	51.65	" 1560 "	Aug. 6th, "
Rhoderick Dhu .....	Trail Creek .....	Red Point G. M. Co., Ltd ..	51.65	" 1200 "	Mar. 12th, "
Roadley .....	" .....	Rhoderick Dhu G. M. Co., Ltd	44.00	" 1493 "	April 7th, "
Roanoke Fraction .....	Slocan .....	Wm. Braden .....	38.46	" 858 "	" 15th, "
Rockland .....	" .....	" .....	2.89	" 844 "	" 7th, "
Robertson Fraction .....	Nelson .....	Jerome Pitre .....	32.7	" 1709 "	May 5th, "
Rainy Day .....	" .....	R. B. Wood .....	0.07	" 1712 "	" 5th, "
Red Oak .....	Trail Creek .....	Rainy Day G. M. Co. ....	45.75	" 1339 "	" 8th, "
Rambler .....	" .....	T. Oliver <i>et al.</i> .....	49.35	" 1162 "	June 3rd, "
Renzi .....	Slocan .....	Rambler & Cariboo Con. G. & M. Co. ....	32.95	" 1246 "	" 8th, "
Rabbit Paw .....	" .....	C. W. Callahan .....	48.3	" 1262 "	July 27th, "
Rene .....	" .....	Star M. & M. Co., Ltd .....	9.79	" 1252 "	" 27th, "
Randolph .....	Trail Creek .....	Goldie Rene M. Co. ....	38.05	" 1520 "	" 27th, "
Red Eagle .....	" .....	Randolph G. M. Co. ....	17.98	" 1279 "	" 28th, "
Red Eagle .....	" .....	Red Eagle G. M. Co., Ltd ..	22.71	" 1615 "	" 28th, "
R. Lee .....	" .....	War Eagle Con. M. Co. ....	13.87	" 1187 "	Sept. 2nd, "

## WEST KOOTENAY.—Continued.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Ruth .....	Slocan .....	H. W. Forster <i>et al</i> .....	18.41	Lot 841, G. 1	Aug. 17th, 1897
Ruth Fraction .....	" .....	" .....	12.3	" 1845 "	" 17th, "
Right Bower .....	Ainsworth ..	Victoria M. & Dev. Co .....	33.65	" 1882 "	Oct. 22nd, "
Robertson .....	Slocan .....	W. K. (B. C.) Exp. & M. Co., Ltd .....	20.54	" 1808 "	Nov. 26th, "
Surprise .....	Trail Creek ..	Paul Blackmar .....	26.41	" 693 "	Jan. 8th, "
Stevenson .....	Slocan .....	C. W. Callahan .....	38.76	" 1331 "	" 7th, "
Sunnyside .....	Trail Creek ..	C. G. Reeder .....	17.86	" 1503 "	Feb. 2nd, "
Snowshoe .....	" .....	Big Three G. M. Co .....	46.00	" 1347 "	" 22nd, "
Southern Belle .....	Trail Creek ..	" .....	29.8	" 1348 "	Feb. 22nd, "
Slocan King .....	Slocan .....	Byron N. White Co .....	19.00	" 547 "	Mar. 23rd, "
Sultana .....	Trail Creek ..	Chas. P. Warren .....	51.65	" 1494 "	April 7th, "
St. George .....	Slocan .....	Wm. Braden .....	20.31	" 846 "	" 14th, "
Shields .....	" .....	" .....	46.99	" 847 "	" 14th, "
Shiloh .....	" .....	" .....	47.77	" 850 "	" 15th, "
Snelling .....	Ainsworth ..	Josiah Thompson, Jr .....	20.66	" 601 "	" 9th, "
Slocan Queen .....	Slocan .....	John A. Finch .....	51.00	" 1015 "	May 4th, "
South Bend .....	Trail Creek ..	J. J. Hennager & A. Wilson.	35.68	" 1635 "	" 6th, "
Skiff Fraction .....	Trout Lake ..	Lillooet, F. R. & Cariboo G. F., Ltd .....	.39	" 1556 "	" 10th, "
Silversmith .....	Slocan .....	Byron N. White Co .....	13.60	" 1010 "	" 10th, "
Stock Exchange .....	Trail Creek ..	Ottawa G. M. Co., Ltd .....	27.43	" 1609 "	" 11th, "
Snowstorm .....	Slocan .....	Ed. Mahon .....	11.08	" 920 "	" 8th, "
Starlight No. 3 .....	" .....	Last Chance M. & M. Co .....	33.61	" 595 "	" 11th, "
Sunday Sun No. 2 .....	Trail Creek ..	W. G. Estep .....	15.18	" 1161 "	June 4th, "
Sterling Fraction .....	" .....	Wm. Caldwell .....	3.57	" 1447 "	July 23rd, "
Star of the East .....	Nelson .....	Thos. A. Brassey .....	37.33	" 1312 "	" 22nd, "
Star of the West .....	" .....	" .....	34.89	" 1311 "	" 27th, "
Scarabacus .....	Trail Creek ..	Hermann L. A. Keller <i>et al</i> ..	26.84	" 1415 "	Sept. 8th, "
Superior .....	Ainsworth ..	Can. Pac. M. & M. Co .....	27.87	" 746 "	Oct. 1st, "
Sadie .....	Trail Creek ..	John N. Lee .....	14.66	" 1393 "	" 13th, "
Skookum .....	Ainsworth ..	Joseph R. Hoffin .....	17.66	" 604 "	Nov. 26th, "
St. Paul .....	Trail Creek ..	F. Guse & E. Johnson .....	31.41	" 1760 "	" 26th, "
Silver Glance Fraction ..	Ainsworth ..	John S. Baker .....	14.7	" 1439 "	Dec. 2nd, "
Tenderfoot .....	Slocan .....	E. E. Evans .....	17.19	" 1248 "	Jan. 15th, "
Tourmaline .....	Trail Creek ..	Robert F. Dodd .....	10.55	" 457 "	" 28th, "
Tip Top .....	" .....	Trail Mining Co .....	35.24	" 798 "	Mar. 22nd, "
Twin .....	Ainsworth ..	J. B. McArthur & D. F. Strobeck .....	46.53	" 591 "	" 22nd, "
Third of July .....	Slocan .....	London Hill M. & Dev. Co ..	51.65	" 1417 "	May 17th, "
Trilby .....	Trail Creek ..	John McMartin .....	47.76	" 1626 "	June 3rd, "
Tramway .....	" .....	W. N. Dunn & M. Sullivan ..	22.71	" 1826 "	July 22nd, "
Trenton .....	" .....	S. L. Williams & J. Benn ..	51.00	" 1361 "	June 2nd, "
Triumph .....	" .....	Victory-Triumph G. M. Co., Ltd .....	51.65	" 1364 "	" 14th, "
Tariff .....	Ainsworth ..	Wm. Braden .....	18.97	" 1714 "	Sept. 30th, "
Union Jack .....	Trail Creek ..	L. H. Merrill .....	47.30	" 1288 "	April 6th, "
Union Jack .....	Nelson .....	J. B. Daly & J. H. Young ..	14.70	" 244 "	Dec. 2nd, "
Venetia Boy .....	" .....	John Johnson .....	15.59	" 408 "	Mar. 9th, "
Vancouver No. 2 .....	Slocan .....	Vancouver Group M. Co., Ltd	43.32	" 739 "	June 8th, "
Victory .....	Trail Creek ..	Victory-Triumph G. M. Co., Ltd .....	26.3	" 1365 "	June 14th, "
Volney .....	" .....	B. C. Gold Discovery Co .....	36.00	" 1441 "	Sept. 2nd, "
Venus .....	" .....	" .....	22.00	" 1213 "	" 24th, "
Whitewater .....	Ainsworth ..	J. C. Eaton .....	42.90	" 1170 "	Jan. 8th, "
Wild Goose No. 2 .....	Slocan .....	Albert Behne .....	36.9	" 1263 "	Feb. 18th, "
Windsor .....	" .....	Byron N. White Co .....	27.25	" 1016 "	May 10th, "
Wisconsin .....	Trail Creek ..	L. J. McAtee .....	42.4	" 1692 "	" 11th, "
Wild Goose .....	Slocan .....	Noble Five Con. M. & M. Co	33.10	" 614 "	" 11th, "
Winnipeg .....	Trail Creek ..	Douglas F. Johnston .....	41.8	" 1519 "	July 27th, "
White Swan .....	" .....	War Eagle Con. M. Co .....	30.66	" 929 "	Sept. 3rd, "
White Elephant .....	" .....	Nanaimo-Roesland M. Co .....	42.12	" 1357 "	" 23rd, "
Wide West No. 2 .....	" .....	T. W. Stack & C. McDonell ..	51.65	" 1953 "	Oct. 13th, "
Wakefield .....	Slocan .....	W. K. (B. C.) Explor. & M. Co., Ltd .....	51.15	" 1527 "	Nov. 26th, "
Wallingford .....	Trail .....	M. A. L. Archer & P. W. Peterson .....	51.5	" 1790 "	Dec. 15th, "

WEST KOOTENAY.—*Concluded.*

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
World's Fair.....	Slocan.....	Noble Five Con. M. & M. Co	15.28	Lot 464 G. 1	Dec. 15th, 1897
Young America.....	Trail Creek..	Young Brit.-Am. G M. Co., Ld	37.68	" 1233 "	Jan. 28th, "
Yale .....	" .....	Yale Gold-Copper M. Co., Ld	23.41	" 533 "	April 6th, "
Ymir.....	Nelson .....	Joseph Pitre.....	40.97	" 1708 "	May 5th, "

## LILLOOET.

Ample.....	Lillooet.....	John Marshall .....	40.28	Lot 335, G 1	Jan. 14th, 1897
Golden Eagle.....	" .....	Golden Cache M. Co.....	47.00	" 370 "	May 12th, "
Golden Stripe.....	" .....	" .....	41.18	" 373 "	" 13th, "
Jumbo.....	" .....	" .....	24.98	" 376 "	" 13th, "
North Star.....	" .....	" .....	49.70	" 371 "	" 12th, "
Ruby.....	" .....	" .....	44.95	" 372 "	" 13th, "
Whale.....	" .....	John Marshall .....	51.65	" 334 "	Jan. 11th, "

## NEW WESTMINSTER.

Brady .....	Nanaimo .....	Vic.-Texada G. M. Co., Ld ..	.82	Lot 124	Sept. 17th, 1897
Francis .....	" .....	" .....	9.7	" 122	" 13th, "
Neptune .....	N. West'mr.	Bowen Island G. M. Co. ....	46.06	" 1658, G 1	July 21st, "
Potosa.....	Texada Isl'd.	Vic.-Texada G. M. Co., Ld ..	32.73	" 121 Tex.	Sept. 10th, "
Porpoise.....	Nanaimo .....	" .....	1.44	" 123, G 1	" 17th, "

## SAYWARD AND COAST.

Alexandra .....	Nanaimo .....	H. Rhodes .....	44.1	Lot 225, R 1	Feb. 19th, 1897
Climax .....	" .....	Texada-Kirk Lake, G.M. Ld,	46.00	" 49 "	April 5th, "
Duchess .....	" .....	H. Rhodes .....	.....	" 231 "	Feb. 19th, "
Duke .....	" .....	" .....	45.40	" 229 "	" 19th, "
Dorothy Morton.....	" .....	P. J. Chick & C. Moody.....	51.65	" 253 "	Dec. 2nd, "
Highland Laddie .....	" .....	H. Rhodes .....	45.90	" 228 "	Feb. 19th, "
Last Link.....	" .....	Texada-Kirk Lake G. M., Ld	30.89	" 51	April 5th, "
Lindsay .....	" .....	" .....	39.17	" 50	" 5th, "
Shoo Fly.....	" .....	A. J. Smith & D. Leahy ....	31.9	" 243 "	June 8th, "
Texada .....	" .....	Texada-Kirk Lake G. M., Ld	45.03	" 48	April 12th, "
Victoria .....	" .....	" .....	51.65	" 47	" 12th, "
White Pine .....	" .....	Channe Mining Co .....	46.93	" 234, G 1	July 30th, "

## YALE.

Alice .....	Osoyoos .....	Sir Charles Ross .....	30.26	Lot 698, G 1	Mar. 12th, 1897
Argentum.....	Yale .....	R. Marpole <i>et al</i> .....	49.9	" 830 "	April 30th, "
Barbara .....	Osoyoos .....	G. A. Rendell .....	28.5	" 817	Oct. 13th, "
Bullion .....	" .....	Lafrenz, Tait & Railston....	16.72	" 734 "	Nov. 16th, "
Comstock .....	" .....	W. A. Dier .....	51.65	" 729 "	Sept. 9th, "
Crown Silver .....	" .....	W. L. Hogg .....	18.8	" 789 "	Dec. 2nd, "
Dundee .....	" .....	J. Sutherland & R. Wood....	42.00	" 601 "	Jan. 15th, "
Douglas Deighton .....	Yale .....	W. Teague & B. Douglas....	20.66	" 631	Aug. 3rd, "
Evening Star.....	Osoyoos .....	John Stevens <i>et al</i> .....	19.00	" 543 "	April 9th, "
Elmore .....	" .....	A. A. Davidson .....	44.19	" 733 "	Sept. 9th, "
Fontenoy .....	" .....	Duncan A. Cameron .....	47.86	" 752 "	Oct. 22nd, "
Gold Drop .....	" .....	F. C. Innes .....	32.29	" 899 "	Nov. 16th, "
Homestake.....	Kamloops....	R. Marpole <i>et al</i> .....	51.65	" 827 "	April 30th, "



YALE.—*Concluded.*

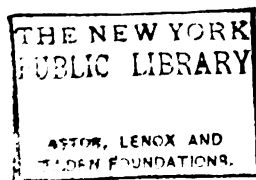
Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Helen .. .	Osoyoos .. .	Boundary-Helen G. M. Co., Ltd	29.94	Lot 691 G. 1	Oct. 12th, 1897
Jumbo .. .	" .. .	T. L. Savage & Rendall. ....	39.3	" 655 "	Feb. 18th, "
Last Chance .. .	" .. .	Phil Austin <i>et al</i> .. .	19.2	" 660 "	" 18th, "
Lexington .. .	" .. .	G. W. Rumberger <i>et al</i> .. .	20.66	" 645 "	Jan. 15th, "
Last Chance .. .	" .. .	Republic G. M. Co. ....	40.2	" 644 "	April 7th, "
Lemon .. .	" .. .	Matthew J. Greevy .. .	51.65	" 760 "	Nov. 16th, "
Last Chance .. .	" .. .	Boundary Creek M. Co. ....	46.83	" 753 "	Oct. 22nd, "
Morrison .. .	" .. .	George T. Crane .. .	34.5	" 654 "	Feb. 18th, "
Minnichaha .. .	" .. .	Ainsley Megrau .. .	50.7	" 680 "	Mar. 10th, "
Maple Leaf .. .	Yale .. .	R. Marpole <i>et al</i> .. .	49.8	" 828 "	April 30th, "
Maple Leaf .. .	Osoyoos .. .	Jas. Lynch .. .	13.63	" 613 "	Aug. 5th, "
Monarch .. .	" .. .	Thos. Humphrey .. .	51.13	" 701 "	" 4th, "
Mammoth .. .	" .. .	Dier & Davidson .. .	50.06	" 545 "	Nov. 26th, "
Mamont .. .	" .. .	Ferdinand Dittmer .. .	45.89	" 879 "	Dec. 2nd, "
Nonsuch .. .	" .. .	Republic G. M. Co. ....	16.50	" 389 "	April 6th, "
Oro .. .	" .. .	John Douglas .. .	16.68	" 614 "	Mar. 10th, "
Old England .. .	" .. .	Henry Nicholson .. .	51.3	" 658 "	Nov. 16th, "
Potter Palmer .. .	" .. .	Edwin S. Graham .. .	47.18	" 661 "	April 29th, "
Pathfinder .. .	" .. .	Pathfinder Mining, Reduct'n & Investment Co .. .	51.65	" 782 "	Nov. 26th, "
Queen .. .	Yale .. .	Wm. Teague .. .	20.66	" 63 "	Aug. 3rd, "
Sunset .. .	Osoyoos .. .	W. L. Hogg .. .	20.2	" 788 "	Dec. 2nd, "
Texas .. .	" .. .	Edwin S. Graham .. .	32.02	" 662 "	April 30th, "
Troublesome .. .	Yale .. .	R. Marpole <i>et al</i> .. .	38.25	" 829 "	" 30th, "
Tamarack .. .	Osoyoos .. .	Franklin Riffle .. .	49.60	" 783 "	Nov. 26th, "
Vernon .. .	" .. .	Hugh Cameron .. .	45.3	" 759 "	" 26th, "
War Eagle .. .	" .. .	R. Denzler & T. W. Johnson.	20.68	" 678 "	April 8th, "



EIGHT-FOOT QUARTZ VEIN, "BROWN BEAR."



THIRTY-FOOT QUARTZ VEIN, "MORNING STAR,"  
FAIRVIEW, B. C.



## GOLD COMMISSIONERS AND MINING RECORDERS.

Mining Divisions.	Name of Recorder.	Address.	Name of Gold Commissioner.	Address.
<b>Cassiar, etc.—</b>				
Stickine .....	James Porter .....	Telegraph Creek ...	} James Porter ...	Telegraph Creek.
Liard .....	" .....	" .....		
McDame .....	" .....	" .....		
Laketon .....	" .....	" .....		
Skeena .....	John Flewin .....	Fort Simpson .....	} W. S. Gore .....	Victoria.
Omineca (Land Rec'd'g D. ...)	Ezra Evans .....	Manson Creek .....		
Bennett Lake .....	W. J. Rant .....	Bennett Lake .....	W. J. Rant .....	Bennett Lake.
<b>Cariboo—</b>				
Omineca .....	W. V. Bowron .....	Barkerville .....	} Jno. Bowron ...	Barkerville.
Richfield .....	" .....	" .....		
Quesnelle .....	W. Stephenson ...	Quesnelle Forks ...		
Victoria .....	W. S. Gore .....	Victoria .....	W. S. Gore .....	Victoria.
<b>Yale—</b>				
Kamloops .....	E. T. W. Pearse ...	Kamloops .....	} G. C. Tunstall ...	Kamloops.
Yale .....	Wm. Dodd .....	Yale .....		
Similkameen .....	H. Hunter .....	Granite Creek .....	} C. A. R. Lambly.	Osoyoos.
Vernon .....	J. C. Tunstall .....	Vernon .....		
Osoyoos .....	J. R. Brown .....	Osoyoos .....		
Kettle River .....	W. G. McMynn ...	Midway .....		
Grand Forks .....	S. R. Almond .....	Grand Forks .....		
<b>East Kootenay—</b>				
Donald .....	J. Stirret .....	Donald .....	} J. E. Griffith ...	Donald.
Golden .....	F. C. Lang .....	Golden .....		
Windermere .....	G. Goldie .....	Windermere .....	} J. F. Armstrong.	Fort Steele.
Fort Steele .....	C. M. Edwards ...	Fort Steele .....		
" .....	M. Phillips .....	Tobacco Plains ...		
<b>West Kootenay—</b>				
Revelstoke .....	W. G. Paxton .....	Revelstoke .....	} J. D. Sibbald ...	Revelstoke.
Illecillewaet .....	W. Scott .....	Illecillewaet .....		
Lardeau .....	" .....	Lardeau .....		
Trout Lake .....	W. H. Vickers ...	Trout Lake .....	} O. G. Dennis ...	Nelson.
Slocan .....	A. Sproat .....	New Denver .....		
Ainsworth .....	John Keen .....	Kaslo .....		
Nelson .....	R. F. Tolmie .....	Nelson .....		
Trail Creek .....	J. Kirkup .....	Roseland .....		
Goat River .....	J. C. Rykert .....	Rykert's .....		
Slocan City .....	H. P. Christie ...	Slocan City .....		
Arrow Lake .....	F. G. Fauquier ...	Nakusp .....		
Nanaimo .....	M. Bray .....	Nanaimo .....	M. Bray .....	Nanaimo.
Alberni .....	Thos. Fletcher ...	Alberni .....	Thos. Fletcher ...	Alberni.
<b>Lillooet—</b>				
Clinton .....	F. Soues .....	Clinton .....	} F. Soues .....	Clinton.
Lillooet .....	C. A. Phair .....	Lillooet .....		
New Westminster .....	D. Robson .....	New Westminster .	W. S. Gore .....	Victoria.

## NEW WESTMINSTER DIVISION.

D. ROBSON, MINING RECORDER.

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"I have the honour to submit some statistics of the mining business of this division during the year 1897, accompanied by a brief reference to some of the mining camps. In my report for 1896, it was stated that 'the mining outlook in this division for 1897 is very hopeful.' This remark has, I think, been justified by the year's operations, as shown by the following comparative statement of the mining business of the division during the past three years :—

	1895.	1896.	1897.
Free Miner's Certificates issued .....	468	1,150	2,760
Mineral claims recorded .....	182	518	1,883
Certificates of work issued .....	12	37	199
Conveyances recorded .....	3	81	295
Revenue from Free Miner's Certificates .....	\$2,340	\$5,900	\$22,724
do other sources .....	655	1,762	6,139
Total mining revenue .....	\$2,995	\$7,662	\$28,863

Of the Free Miner's Certificates mentioned above, 125 were issued at the Vancouver agency, and 24 at Douglas. About the middle of the year a considerable area of mining territory (lying between Jervis Inlet and Lewis Channel) was taken from this division and added to the Nanaimo district.

"Although a great deal of prospecting has been done, and a large number of claims have been located, it is to be regretted that there has been comparatively little work done in the development of mining properties. With the exception, perhaps, of a score of claims, the work done has not much exceeded that which was required to obtain a certificate of work. It should be remembered, however, that many of the claims were taken up late in the season, and are so situated that they could not be developed without large expenditure.

"In 1896 the 'Province' mine, on Harrison Lake, attracted the greatest attention of any mine in the division. In 1897 the Fire Mountain group of mines has been dividing public interest with the Harrison Lake group, and Pitt Lake has also attracted a good deal of attention. In these three groups the largest amount of development work has been done.

"On the 'Province' mine there has been spent about \$10,000. There are three distinct lodes on the surface, which have been worked. The middle lode is almost perpendicular, and the other two converge towards this lode as they go down. It is believed that at a certain depth these three lodes will merge into one, and the company is now sinking a shaft through the middle lode, in the direction of the supposed combination. There has been 150 feet of shafting and 250 feet of tunnelling done on this mine. Assays range all the way from \$1 to \$2,000 to the ton—but assays of small samples are never reliable as a basis of value. About three cars of ore were shipped to the smelter last summer, and gave an average return of \$27 per ton in gold and silver. The ore is partly free milling, about 40 % of the gold being free. There are now about 100 tons of ore on the dump. It is the intention of the company to put in the necessary machinery this year, and prosecute the work with vigour.

"In the Fire Mountain camp, about 16 miles north-west of the head of Harrison Lake, a large number of claims have been recorded. A great many of these claims were staked before the snow left the ground last spring, and in some cases, I am informed, the stakes were planted in five or six feet of snow. The Fire Mountain and Fire Lake Gold Mining Companies have expended about \$50,000 in connection with their properties in this region during the year. The companies have built wharves at the townsite of Tipella, at the head of Harrison Lake, and constructed a pack-trail from that point to the mining camp, about 16 miles. A saw-mill has been erected, having a capacity of 10,000 feet per day, and also a mill for the treatment of ore, having a capacity of 30 tons per day. The ore of Fire Mountain is generally free-milling. On the 'Money Spinner,' one of the claims of this group, there has been considerable

development work done, and the company expresses itself very well satisfied with its prospects. A tunnel 175 feet in length has been cut on the vein, and a 75-foot shaft sunk. The vein is about 8 feet in thickness, and has been exposed for a distance of 1,000 feet. A trial shipment of 200 lbs. of ore from this mine, sent to San Francisco, gave \$74.13 in gold per ton. There are now 1,500 tons of ore on the dump, and thousands of tons in sight. The mill has just been put in operation, and it is expected that this year will see a large output of the precious metal from this very promising camp. The Skookum Chuck Mining Company has also a group of six claims on Fire Mountain, adjoining the Fire Mountain Gold Mining Company's property. This company has done work amounting to about \$1,000. The prospects are most encouraging, and the six claims have been bonded for \$100,000.

"On Pitt Lake a large number of claims have been located, and on three of these (the 'Cromwell,' 'Champion,' and 'Rocket'), considerable development work has been done. On the Cromwell and Champion, owned by Messrs. Seymour and Clinton, between \$4,000 and \$5,000 have been spent. A tunnel 60 feet in length has been driven from the east side, and on the west side an adit of 100 feet has been driven to tap the lode. Both these cuttings are in the lode. These are copper propositions, showing gold and silver as well. Assays have given from \$70 to \$72 per ton. On the Rocket claim, owned by the Golden Ears Mining Co., the expenditure has amounted to about \$3,000. There are two lodes on this claim which have been exposed for a distance of about 1,500 feet, showing a width of from 4 to 10 feet. These lodes are principally copper, with a percentage of gold and silver. Assays have been obtained from \$40 to \$500 to the ton. Three tons sent to Swansea realised about \$45 to the ton. This is the actual cash value received by the company, and shows beyond question that the claim is a valuable property, if the lodes are of such extent as the appearances seem to indicate. The company expects to continue development work during the coming season.

"The 'Fat Man' and 'Nancy Jane' are the names of two claims situated on the line of the C. P. R., near Agassiz, which are making an excellent showing. Work has been done on the Fat Man to the value of about \$3,000. A shaft 45 feet in length, and three adits, aggregating 210 feet, have been made. There are two lodes on this property parallel to each other, and about 150 feet apart, carrying gold, silver, copper, lead and zinc. These lodes, as far as exposed, show a width of from 5 to 17 feet, and assays as high as \$65 to the ton have been obtained. This is essentially a copper proposition, and is likely to be developed extensively during the coming season.

"On Bowen Island, development work has been done on the mining properties of Mr. Fraser, to the value of about \$7,000, and the indications are said to be most encouraging. On Jervis Inlet, Princess Royal Reach, and elsewhere on the coast, there are several properties which have made a good showing.

"There have been very few placer mines operated in this division during the year, and the results on such as have been operated are unknown. Several leases for dredging purposes have been taken out, and it is expected that dredging operations will be carried on quite extensively this year on the Fraser River, between Yale and Chilliwack. A company has been formed for this purpose, and, I am informed, the necessary capital has been provided. If the appliances are such as to meet the circumstances, there is every reason to expect that considerable quantities of gold will be taken out of the river within the area mentioned.

"The mining operations of this division may be said to be quite promising. The total expenditure in development last year must have been at least \$100,000, and the expenditure during the present year is likely to be considerably larger. It may be reasonably expected that three or four of the mines will become regular shippers before the close of the season, and this will encourage owners of other mining properties to prosecute development work with greater energy."

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## YALE DISTRICT.

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### GRAND FORKS—KETTLE RIVER DIVISION.

#### THE BOUNDARY CREEK REGION.

**Boundary Creek.** This is the name now generally given to the large and important region extending from Fourth of July Creek to the main Kettle River as it flows from the north, embracing all the territory drained by Boundary Creek and its tributaries. Within this area veins and deposits of great promise and diversity in kind have been discovered, on which a fair amount of work is being done, but this district is in this peculiar condition in that the claim owners, seeing that the best and cheapest facilities for transport and treatment of ores are demanded, are waiting for these facilities to be supplied or definitely promised before undertaking very serious development work.

Two companies have charters to build a railroad through this district, but the holders have carefully studied the situation, and if the mining men will prove up the existence, under these extensive surface showings, of ore bodies that will promise a good tonnage for transport to the smelting centres or warrant the establishment of smelters here, the building of a railroad will be much expedited. Mining men should not hesitate in doing extensive and all-important prospecting, should not wait for the *next* man, as they can rest assured that they must lead the way, *i.e.*, prove up mines and deposits of pay ore and the railroads will quickly come. Realizing this fact to a certain extent more determined work is now being done, steam mine plants are or are about to be installed on several properties by men strong financially, and some of these large but, as yet, too low grade gold-copper deposits will be thoroughly prospected and the true significance of these surface indications wrought out.

Besides the Boundary Creek Region in which, so far, the most discoveries have been made, is the Grand Forks Region, or the North Fork of the Kettle River and its tributaries, where many claims have been staked off, but in this Report the different camps visited will be described irrespective of their location in the two recording divisions.

#### LOCATION.

The former Kettle River Recording Division, in the Southern Yale District, extended west from the Trail Creek Division, or West Kootenay, along the International Boundary Line to the Osoyoos Division, thence north to the Vernon Division, embracing the valleys of Christina Lake, the North Fork of Kettle River, Boundary and Fourth of July Creeks, and the main Kettle River that leaves the Province at Midway to enter a few miles west of Grand Forks. All these waters finally merge in the Kettle River, which crosses the line south of Christina Lake and flows into the Columbia River at Marcus, in the State of Washington.

For greater convenience of recording, this Division was divided last summer into the Kettle River and Grand Forks Recording Divisions, with the Government offices at Midway in the former and Grand Forks in the latter.

#### TOPOGRAPHY.

This district has not the rugged, lofty, mountainous character seen in the Kootenays, at least the southern portion within the ken of the main body of prospectors, as none of the well-timbered, rounded mountains rise much above 5,000 feet, or 3,200 feet above Grand Forks. The trend of the valleys, as seen by the course of the various rivers, is north and south, and is dependent in some way upon the geological conditions, but there are low-lying connecting valleys or passes which, with the easy slopes, will greatly simplify the construction of a railroad that, to reach the chief points, will have to traverse a somewhat circuitous route.

Most of the country is well-timbered, but some slopes are quite treeless and covered with bunch grass, while most of the valley of the Kettle River is open and affords fine ranches when irrigated for all kinds of cereals and fruits, as the rainfall is small.

## ROADS AND TRAILS.

Road building is not attended with any serious difficulties. The main Government road from Penticton, where connection is made with the C.P.R. by steamer "Aberdeen," after leaving Camp McKinney and following Rock Creek enters the Kettle River Valley at the mouth of Rock Creek and continues to Midway, beautifully situated in a wide valley, then up Boundary Creek, four miles to Boundary Falls and six miles to Anaconda, where the road turns to the east, while a road runs 1.5 miles north to Greenwood, the largest, most central and only incorporated town in Boundary Creek region. The enterprising founders of this town have built miles of road to the different surrounding camps, one of which, passing the hospital, traverses "Greenwood" and "Wellington" camps, and then joins the main Government road which enters the large and fruitful valley of Grand Forks, finely located at the junction of the North Fork and main Kettle Rivers. Thence the road runs to Marcus, or to Bossberg, on the Columbia, connecting with the Spokane N.R.R. to Rossland, Nelson, etc., on the north, or Spokane, etc., to the south.

Stages run two or three times a week from Penticton to Marcus or Bossberg *via* the towns mentioned, with the following scale of distances :—

Penticton to Camp McKinney.....	56 miles.
Camp McKinney to Midway.....	32 "
Midway to Greenwood .....	8 "
Greenwood to Grand Forks .....	23 "
Grand Forks to Marcus.....	45 "

Much of this road is good, but very dusty in dry weather, but much yet requires great improvement. It takes three days to travel from Penticton to Marcus, stopping over night at Camp McKinney and Grand Forks, after spending one night at Penticton.

Roads branch off at Rock Creek, Midway and Carson and cross into the United States, while roads are built from Greenwood and Grand Forks to the camps. Good pack trails run in many directions, and the prospector has easy access to much of this country.

Railroad charters are held by two companies; (a) by the Columbia and Western from Robson, on the Columbia, to Penticton; (b) the second charter recently bought by McKenzie and Mann, of Toronto, who are buying mining properties near Greenwood, is for a line from the Coast to Penticton, thence *via* Midway, Greenwood and Grand Forks to the Columbia River. During the coming year (1898) it is very probable that railroad construction through this district will see its commencement, following which a very great impulse will be given to mining work.

## GEOLOGY

No geological survey of this region has yet been made, but Mr. S. S. Fowler, M.E., has given a very succinct account in the Minister of Mines Report for 1896, as he had been over much of this ground during the two or three seasons he spent there studying the different mining camps. The writer, passing quickly from camp to camp, was able to form only a very general idea of the geological conditions, as all available time was devoted to the ore-deposits and their immediate environment.

However, the preponderant rock formation noticed from the North Fork of the main Kettle River was seen to be very highly metamorphosed, Archæan sedimentaries or gneisses, schists, quartzites, slates and perhaps some crystalline limestone, in which are found almost all the gold-bearing veins and veins of high grade silver-gold ore. Over-lying these rocks are seen the fragmentary areas of highly altered limestone, as this region has been subjected to much eruptive action along lines of fracture and eruption running northerly and southerly; and all the formations are traversed by dykes of various eruptives and overlain in part by areas of effusive rock, mostly light to dark green, partially crystalline, fine-grained, feldspathic rock, the miners "diorite," which is a very important member, as in this are all the large zones impregnated with gold, chalcopyrite, hæmatite and sometimes pyrrhotite and iron pyrites. Many of these deposits lie in contact with or close proximity to very crystalline limestones, which generally show a nearly perpendicular plane of contact with the general strike of north and south. Up the valley of Boundary Creek for about eight miles, or to Long Lake, flanked on either side runs a narrow belt of light-coloured hornblende granite in which has been found small veins of high grade silver-gold ore, as on the "San Bernard" claim. There are also large bosses of highly crystalline rock breaking up through the other formations, of syenite, diorite,



etc., and dykes cutting every other formation are frequent. In Central Camp the greenish eruptive rocks have evidently been highly altered and rendered in places quite schistose.

East of Grand Forks, along the road, are schists, and up the North Fork are well bedded quartzites, and gneisses traversed by large masses of eruptive rock of various kinds. To the north of this district prospectors claim there is much granite, like that seen near Camp McKinney, and also the stratified Archæan rock.

Near Rock Creek is an area eight to ten miles long of sandstones and shales, probably of Cretaceous age, and here are found deposits of a fair grade of coal, on which practically little or no work has been done in exploration.

#### ORES AND ORE DEPOSITS.

Some have written of this region as being rich in copper ores, but as yet this is not proved, but there are certainly large zones carrying from 1 to 3 and 4 per cent. of copper, and some gold values. About all one can say at the present stage of very scanty development is that throughout this region are (apart from the quartz veins and veins of high grade ore) large ledges or mineralized portions of the greenish, feldspathic rock, already described, from which good gold assays are obtained and which offer every inducement to extensive exploration. If more concentrated parts or regular ore-shutes are found, there is every reason to believe that such ore would prove to be very profitable as such good, but not pay, values are already got from a large amount of mineralized rock matter, and even some good pay ore has been found in the very limited work done.

It is impossible at the present time to give a definite or really satisfactory account of the ores and ore deposits of the Kettle River-Grand Forks District, as no producing mine has yet developed; no smelter or mill returns can be referred to, and much of the workings could not be seen as work had not been resumed and water had accumulated, but the prospects of this becoming an important mining district are excellent if we can judge from surface indications and the little work done. To attempt a classification of the different forms of veins or ore deposits is difficult, as throughout this region is found a great variety of ores, but perhaps one classification might be,

(A.)—Veins with quartz gangue and different minerals.

(B.)—Deposits or country rock, impregnated with copper, gold, and iron, etc.

**Quartz Veins.** These quartz veins are very varied and nearly every combination can be found, as—

(a.) Quartz with iron pyrites and zinc blende, with gold and silver, on the "No. 7," Central Camp.

(b.) Quartz with tetrahedrite, on the "Lincoln," Central Camp.

(c.) Quartz with chalcopyrite, pyrrhotite and gold, "Golden Crown," Wellington Camp.

(d.) Quartz with galena, zinc blende, and high silver values, as on the "Skylark," "Helen," "San Bernard," "D. D.," "Last Chance," etc.

(e.) Quartz with pyrrhotite and gold values, Long Lake Camp.

(f.) Quartz with iron pyrites and some gold, as the "Boundary Falls."

Nearly all of these veins are found in the highly altered sedimentary rocks and the eruptive granites, and, while mostly small, may become important when a railroad gives cheaper transport for ore.

**Deposits.** The large deposits or *mineralized zones* may be classed as follows:—

(a.) Greenish feldspathic rocks, impregnated with chalcopyrite, gold, traces of magnetite or hæmatite, and sometimes pyrrhotite, as "Mother Lode," "Stemwinder," "B. C.," "Volcanic," etc.

(b.) Large masses or deposits of magnetite, as on the "Knob Hill," "Oro Denero," "Emma," etc.

(c.) Country rock, impregnated with hæmatite, with some copper, gold and silver values, as "Gold Drop," "Snowshoe," "Big Copper," etc.

(d.) Bodies of very nearly solid pyrrhotite, that with as yet, very small gold silver values, as on Pass Creek, Christina Lake, etc.

The "surface showings" throughout this region are certainly very flattering, although it must be admitted that very little pay ore (*i.e.* under the best of considerations) has yet been found. The future of these camps rests greatly upon results of the development work, and at the time of going to press with this report, a much larger amount of underground work is being done or begun, with the assurance that if good bodies of pay ore are proved up, railroad

and other facilities will soon follow, and that more abundant capital will flow in. Many mining districts in other countries languish because interest has never been aroused to their mining possibilities, but in British Columbia any part or region will now command instant attention if the miner by his work can show that he has discovered what may be made a mine.

#### CENTRAL CAMP.

This camp presents a variety of ores; in that on the "No. 7," "Mabel," "Norfolk," "New York," "No. 9," etc., are gold or gold-silver-bearing quartz veins; on the "Cornucopia," pyrrhotite; on the "City of Paris," "Oro," "Golden Rod," "St. Maurice," "Lexington," etc., auriferous copper sulphides, and on the "Lincoln," quartz with argentiferous grey copper.

Central Camp, locally known as White's, Douglas and Attwood's Camps, lies at an elevation of 4,000 to 4,500 feet along the very heavily timbered mountain spur, at the head of Douglas Creek, 8 miles by trail from Midway, and 5 miles from Boundary Falls. The formation consists of light coloured, greenish schistose rock, cut by dykes which appear to have nearly the same trend as that of the spur and of the schistose stratification, or about N.W. by S.E. A considerable amount of work was done, particularly in the years 1893-4, and with the exception of the "No. 7," and the operation of the French company, no work was being done at the time of visit (June), and with surface cuts caved and shafts filled with water, it was difficult to get as much information concerning these ore deposits as otherwise these openings might have afforded. However, as to assay values of the ore, very reliable data has been secured by the writer, and a description of some of the claims beginning at the N.W. end, or Attwood's Camp, is now appended.

Water for milling purposes, on a limited scale, may be sufficient in two small streams from 1,200 to 1,500 feet below the properties.

Title Crown grant, 20.66 acres, purchased for \$13,800 by the Boundary

**No. 7.** Mines Co., New York; superintendent, F. Keffer. A strong vein, 1 to 4 feet wide, averaging 2 to 2½ feet, of bluish quartz, with considerable iron pyrites and zinc blende and a little galena dispersed mostly along the central portion of the vein, is exposed by cuts for nearly one thousand feet in the claim, with a strike N. 60° W. and dip N. 30° E. of 50° to 55°, being conformable with the enclosing schistose rocks, although a dyke of light-coloured fine-grained rock follows along as the hanging wall for most of the distance of the exposed vein, the underlying schists being so soft that all work is done there, leaving the clean quartz standing in the hanging.

An incline, or shaft No. 1, equipped with a horse whim, was down 140 feet along the vein, with, at 130 feet, 200 feet of drifting along a foot vein and a cross-cut southerly 200 feet running to intersect another quartz ledge showing on the surface. These workings were full of water. Two faults, at right angles to the vein and of 30 to 46 feet dislocation to N. when looking N.W., about 700 feet apart, have been found, and in shaft No. 2, 450 feet from No. 1, after sinking along the formation, then cross-cutting 30 feet to S.W., the vein has been found south of one of these breaks, and the shaft is being now sunk vertically to the vein. A general sample taken from the various cuts is stated to have given \$35.50 in gold, while another sample of ore from shaft gave \$3 in gold and 15.3 of silver per ton, which ore, when roughly concentrated by panning, 12½ to 1, then assayed \$20 in gold and 82 ounces silver per ton of concentrates. The ore from this vein may be treated by stamping and concentrating, the concentrates being sent to smelters, but in the meanwhile the property is simply being carefully prospected.

A second ledge of pinkish-white quartz, with very little mineralization, lies about 100 feet S.W. of the main vein, and will be yet explored by the cross cut from No. 1 shaft. Assessment was being done by this company on six other contiguous locations, the "Lady of the Lake," "Glasgow," "McGregor," "Helen," "Fannie H."

*Norfolk* and *No. 9*, 1,500 x 1,500, owned by S. S. Fowler *et al.*, are located on the N.W. extension of the No. 7 vein, and on the former the vein is shown two to three feet wide by open cuts for nearly 600 feet, while it is thought to out-crop on the No. 9, but no work is yet done to demonstrate this.

*New York*, 600 x 1,500, owned by Jno. Douglas, is the N.W. extension of the ledge of white quartz on No. 7, and an 80-foot shaft has been sunk. Full of water.

*Bob Roy* and *Falcon*, located as the S.E. extension of No. 7, have had some work done on them, but these workings were not seen.

**Mabel.**

Title, Crown grant, owned by Jno. Douglas, Midway; also the "Oro" and "Cornucopia"; lie south of the No. 7, or at Douglas' camp.

**Mabel.** There are three veins on this claim developed by shafts, but not traced out along their strike by further work. The first vein is small, 3 to 14 inches wide, down which is a small inclined shaft, 40 feet deep, showing the vein widest at the bottom, with quartz and well crystallized iron pyrites giving, it is stated, high gold values. Strike N. 60° W., dip N. 30° E. 60°. Vein No. 2 has a shaft, half full of water, about 35 feet deep, showing a vein 4 to 8 feet wide of parallel bands of white quartz and the green schistose country rock, the quartz carrying considerable zinc blende and iron pyrites, with a little chalcopyrite and pyrrhotite, 20 pounds of which ore tested by an examining engineer gave an assay value of \$64 in gold, while a sample of barren looking quartz ran \$6. This vein, strike N. 60° W., pitches steeply at first, probably influenced by the contiguous eruptive rock, then dips N. 30° E. at about 60°. Vein No. 3, near the south end of the claim, is small, with a shaft sunk about 40 feet on it, but close by is a much larger exposure of sulphide-bearing quartz which has not yet been prospected.

**Oro.** On this claim, S.E. of the "Mabel," is a wide band of heavy iron-stained schist, in which a shaft has been sunk about 30 feet, disclosing a body, limits or size unknown, of nearly solid copper sulphides and quartz, on either side of which the schist is impregnated with the same mineral, the ore giving assays up to 19 per cent. copper and \$2 to \$3 in gold.

Area 600 x 1,500 feet, lying S.E. of the "Cornucopia," owned by **Golden Rod.** Farrel and Midgeon, of the Parrot Smelting Co., Butte. On this claim is a very wide band of very light-coloured schistose rock, covered by a heavily iron-stained material or nearly typical "iron-cap," as shown by a number of open cuts, in which it is claimed a body of ore 16 feet wide is found, the ore being quartzose, impregnated with copper sulphides and giving good gold assays. A vertical shaft, 80 feet deep, with a cross-cut of 20 feet towards this deposit, is full of water, and no further work has been done since 1893, the principals awaiting the development of the district.

## CITY OF PARIS AND LINCOLN.

Titles, Crown grants; each 600 x 1,500 feet; owned by Jno. Stevens, Fairview, H. White, Carson, Wash., *et al.*; located in White's Camp, about 3,000 feet south-east of the "Golden Rod."

Altitude, about 4,000 feet. Two shafts, 30 feet apart, No. 1 20 feet deep, No. 2 over 50 feet, now filled with water, are reported to disclose a shute of ore consisting of copper and iron pyrites, with some pyrrhotite and quartz, which was 6 to 16 feet wide with, in parts of this shute, several feet of solid mineral. Two general samples from the dumps taken by an examining engineer, who has kindly permitted the writer to benefit of his notes, gave:—(a) Gold, \$13.50; copper, 6.4 per cent.; silica, 26 per cent.; iron, 31 per cent.; (b) Gold, \$11.75; silver, 4.25 ounces; copper, 6.15 per cent.; silica, 31 per cent.; iron, 39.5 per cent. A sample from the centre or from the solid sulphides gave:—Gold, \$27.13; copper, 5.7 per cent.; silica, 10 per cent.; iron, 37 per cent.

This ledge was not seen exposed in any other place, but it is thought to pass through the "Lincoln," where a cross-cut has been started from the shaft down on the "Lincoln" vein in its search.

On this claim extends for nearly 200 feet, with a strike N. 45° W., and dip N.E. of 70°, a large outcrop of white quartz, copper-stained, lying apparently, after a hurried examination, conformable with the enclosing schists, and forming an ore unique in this camp by reason of the quartz carrying tetrahedrite or grey copper, which, it is claimed, gives way in part to chalcopyrite in depth. On the surface this vein shows a width of 4 to 8 feet of quartz, which in places is heavily mineralized, much resembling the ore of the "Best" mine in the Slocan, and into this has been run an open cut and drift, mostly along the hanging-wall. In this cut the vein contains a "horse" of schist rock, and a shaft has been sunk along in the hanging-wall 70 feet (now in water), while a cross-cut, north-easterly, for 100 feet was driven to prospect for the "City of Paris" ledge, thought to pass through in close proximity. The quartz vein is 5 feet thick at the bottom of this shaft.

While some little work has been done, this vein has in reality been but slightly prospected, and as to the values of the ore, some assays of samples taken by the above-mentioned engineer may be of interest.

(a.) General sample from dump of quartz showing only a small amount of mineral—gold \$5; silver, 27.3 ozs.

(b.) General sample from dump at a 20-foot shaft—gold, \$3; silver, 38.5 ozs.

(c.) Quartz from bottom of 70-foot shaft, containing some copper pyrites and grey copper, —gold, \$3; silver, 22.5 ozs.

This one, if further development proves satisfactory, the depth of wash having so far prevented its further exploration on the strike, will be essentially amenable to concentration, and at the present time both these claims are under bond.

A trial shipment of three tons of sorted ore sent to the smelter in Omaha is reported by Mr. White to have yielded \$26 in gold, 212 ozs. silver, and 15 % copper per ton.

#### ST. MAURICE MINING SOCIETY, FRANCE.

This company, M. Ch. Gill, manager, having secured the control of several claims just north of the international line, such as the "St. Maurice," "St. Lawrence," "Jack of Spades," etc., is engaged driving in cross-cut tunnels to intercept a ledge of auriferous copper ore found in the Washington mine immediately across the line, which is believed to pass through some of the claims owned by the company. On the Jack of Spades is said to be a ledge of gold-bearing copper ore, on which several assessments have been done.

#### OTHER CLAIMS.

Other locations have been made in this camp on which both quartz veins and copper-bearing ledges have been found, but, as yet, these are only slightly developed; but on the advent of a railroad, with the consequent much more favourable facilities, this camp will receive much greater attention; the relation of these deposits to one another will be studied and traced out, and those properties now showing up so favourably with the, as yet, meagre amount of work, will receive the much greater attention they certainly merit.

#### DEADWOOD CAMP.

In this camp, from three to four miles north-west of Greenwood City, the *Mother Lode*, *Sunset*, *Green*, and *Morrison* were visited, and work was found in progress on the "Mother Lode" and "Sunset," from which the wagon road from Greenwood City and Anaconda lies about one-half mile distant.

Mr. Frederic Keffer, on behalf of the Boundary Mines Co., New York, **Mother Lode.** is conducting the development and exploration of this claim, which (elevation, 3,300 feet) is 600 x 1,500 feet in area and surveyed for Crown grant. A tunnel had been driven easterly 245 feet through 42 feet of the crystalline limestone, and for the remainder of the distance through fine-grained, greenish, eruptive rock impregnated with a small percentage of chalcopryite, some iron pyrites, and, in parts, very fine-grained magnetite and, probably secondary minerals, calcite and quartz.

The tunnel terminates at a fault (?) plane, along which is the soft gangue, and beyond which the rock has not been broken, as this is thought to be the limit of this copper-bearing zone that, 170 feet wide, lies between the limestone on the west and fine-grained, massive rock on the east, and trends north and south. Throughout this zone, the sulphides are not segregated into solid masses so far as yet developed, nor are they concentrated more in one part than in another, as near the enclosing rocks, but at one point, 90 feet from the face of the tunnel, an incline was being sunk (20 feet June 20th) on a dip of 60° E., the supposed dip of the zone or ledge, in which the rock excavated was carrying a fair amount of the copper sulphides, while in depth further work may be done in the search for concentrated ore bodies or shutes.

Careful and systematic sampling is followed, and while this copper-bearing material will carry from 2 to 3½ % copper, gold-values are constantly found, but the values were not ascertained; but if ore bodies are found carrying a larger percentage of sulphides, wet concentration may be found to be advantageous, although this material, if enough gold is present for profit, will be well adapted for furnace work, as analysis of the ore now gives SiO<sub>2</sub> 35-40 %, FeO 15 %, CaO and MgO 20-25 %, Al<sub>2</sub>O<sub>3</sub> up to 12 %. (Mr. Keffer's analysis.)

On the surface, the mineral-bearing zone is much decomposed and copper-stained, the wash being of a deep, red-brown colour, while much of the surface rock is converted into gossan. In one opening, the vertical plane of contact with the lime was well shown where the copper-bearing rock, here quartzose, lay tightly against the marbleized lime, and in other holes, along what is called the hanging wall, this decomposed ledge matter stops abruptly. A

millsite has been secured two-fifths of a mile distant, where is a fair but adequate supply of water for concentration, but, in the meanwhile, this body of copper-gold-bearing material will be vigorously prospected. Seven men at work. Since last June, another drift across this zone has been driven from the bottom of the incline 90 feet, and much better gold values are being got, which lead to greater expectations of striking pay ore.

The *Sunset* and *Crown Silver*, lying east of the "Mother Lode," and **Sunset.** since sold to W. L. Hogg, of Montreal, were being prospected. The *Sunset* claim extends over a small but steep knoll of diabasic rock containing magnetite and some copper pyrites, which have, on decomposition, converted the surface rock into what the miners term "iron-capping," the blue and green copper stain on which is very prominent for some distance.

Several shallow shafts and cuts have been made on this knoll in which more or less auriferous chalcopyrite is seen irregularly scattered through the rock mass, and now a tunnel is being driven north 75 feet (June 20th), in which some iron pyrites and a very little copper sulphides carrying some gold are found, but it is yet too early to determine the trend and boundaries of this mineralized rock or to form any estimate as to values; further underground development must be awaited.

On the *Crown Silver* some prospecting has been done in much the same material as on the "Sunset." Three men at work.

**Morrison.**—On this claim, 600 by 1,500 feet, owned by Morrison *et al.*, near by the road to the Copper Camp, are a shaft and open cut on a ledge, consisting of massive iron pyrites with some pyrrhotite and chalcopyrite, of which two or three tons lay on the dump by the shaft, which was flooded. In the cut lying next to crystalline limestone were two feet of these sulphides, while 100 feet distant a shaft had been sunk 15 feet in another but small exposure of the same kind of ore, which is stated to carry good gold values.

**Gem.**—Fifteen hundred feet by fifteen hundred feet, John Dunn *et al.*, one-half mile south from the *Mother Lode*. A small open cut had been made in a light coloured, quartzitic rock, where there were two to three feet of very decomposed, red iron-stained quartzose rock and iron pyrites, dipping S. 45°, that carries some gold.

#### COPPER CAMP.

A road about six miles long runs west from Greenwood or Anaconda to this camp, which was at one time the scene of considerable work, although very little was done during the past year. The large exposure on the "Big Copper" attracted much attention, and claims have been staked off for miles along the supposed trend of this lead.

Elevation about 4,400 feet. Along a narrow area of crystalline limestone is a zone of porphyrite very highly mineralized with hematite, which also occurs in solid masses and at the contact with the lime stringers, and sheets of this ore ramify through the limestone. Much of the porphyrite has been shattered, forming a breccia with a hematite cement, but this body at its widest is over 100 feet wide, and in the iron some of the higher copper compounds, such as chalcocite, cuprite, and even metallic copper near the surface, have been found, but so far as work has proceeded this has proved to be a body of iron ore carrying very small values in gold and copper.

This is certainly a very interesting deposit, one that should be prospected much further despite the fact that the work already done has not disclosed pay ore. No work was being done in June. Timber plentiful.

This claim, south-west of the above location, and on the south side of **Last Chance.** a dividing belt of limestone very highly crystalline by contact with the eruptive rock, is a grey, coarsely porphyritic rock, brecciated with a cementing mass of hematite near line of contact. Some open work has been done here, but no traces of mineral other than the iron were seen.

Lying north-east from the "Big Copper" considerable work had been **Enterprise.** done at one time in a shaft sunk by J. E. Boss, but no ore was seen on the surface or dumps, only iron-stained brecciated porphyrite that turns quite black on exposure. No work done for several years; title, Crown grant; area, 15.75 acres.

Title, Crown grant; area, 20.6 acres; owned by Mr. Corbin, of the **King Solomon.** Spokane N. R. R.; lies south-east of the "Big Copper." Here is a 30-foot shaft, where lying next to the marbleized limestone the eruptive rock is somewhat mineralized and traversed by irregular stringers of hematite in

which have been found some chalcocite and native copper. No work has been done for several years on this claim, or on the *Copper Queen*; title, Crown grant; area, 19.25 acres; also owned by Mr. Corbin. Assessment work has been done on many other claims in this locality, but nothing definitely has been discovered upon which to base a report.

#### SMITH'S CAMP.

##### *The Old Republican Mining Co.*

This Company, W. T. Smith, Greenwood, President, owns three Crown-granted claims, located on the hills west of Boundary Creek, near Anaconda.

Elevation 2,700 feet. In the quartzose schists and slates, two tunnels

**Non-such.** have been driven to explore an irregular vein of white quartz, carrying a little iron and copper pyrites, on the trend of which 800 feet to the north-west rises the eruptive mass of granite that runs up this valley. The upper tunnel, 100 feet long, shows a vein 1.5 to 4 feet wide, but the lower, 240 feet long, with a 60-foot cross-cut, was along the vein at the beginning, but shows nothing but stringers of quartz in the schists for most of its distance.

**Last Chance.** On the timberless slopes is an irregular vein from 1 to 30 inches wide, of white, banded quartz with galena, gold, and native silver, and coarse crystalline iron pyrites. This vein is nearly conformable with the enclosing black slates, and is more or less contorted and irregular, as seen in the incline 95 feet deep being sunk on this vein on a dip of 35 to 50 degrees. Several tons of fine looking ore, showing the native silver, were on the dump, and the vein can be traced in several open cuts. Two men were at work.

**Republic.** On the face of the bluff, over-looking Boundary Creek, is a vein with the same strike as the "Last Chance" vein, but cutting across the slates, 12 inches wide, an incline full of water, was down 50 feet, on what was said to be a very uniform vein, and on the dump were 2 or 3 tons of ore, or quartz with much galena, iron pyrites and some blende and copper pyrites, an average sample of which was stated to have assayed 3 ozs. gold and 18 ozs. silver. There is an excellent tunnel site here.

Situated by trail, about 2.5 miles west from Anaconda, are the  
**Golconda.** *Golconda, York, Cleveland, Laocoon and Wild Rose*, owned by Hon. Geo. E. Foster, *et al.*, and under the charge of J. C. Haas, M.E.

On the *Golconda*, along the heavily timbered, steep mountain side, a shaft was being sunk (50 feet) where along a smooth fissure plane in the fine-grained greenish rock, the rock at the surface consisted of decomposed material and iron oxides, which, in depth became very fine-grained sulphides, with traces of copper pyrites, with some gold and silver values. This ledge has been traced for 300 feet by open cuts.

Lying one mile north of "Golconda," owned by the B. C. Gold Fields  
**Iva Lanore.** Exploration, Development and Pro. Co. An incline had been down 32 feet, down on a small ledge carrying some copper pyrites, samples from which assaying 4 to 5 per cent. copper, also assayed \$12 to \$14 in gold.

This claim, about 1,200 yards by waggon road from Boundary Falls, and owned by the Boundary Falls G. M. Co., Vancouver, has a quartz  
**Boundary Falls.** ledge, dip north-west 75, in which the white quartz with coarse iron pyrites is from a few inches to 2 and 5 feet wide where the vein is traceable for about 200 feet. A shaft, 4 by 10 feet, and 40 feet deep, was being sunk, in which the vein was seen to be much split up with stringers running into the country rock, and with no parting or selvage between the gangue and country rock. Several years before, the rotten surface ore was treated in a small two-stamp mill set up at the Falls, but the ore becoming base this mill was then useless. Some samples of this ore give high gold assays, but no average values could be ascertained.

**Tunnel Claim.**—To the north of the above claim, a tunnel had been driven in 40 feet along a quartz vein, 18 to 24 inches wide of quartz, some iron pyrites and copper pyrites.

#### PROVIDENCE CAMP.

This camp embraces those claims lying on either side of Boundary Creek at the town of Greenwood. Here in the band of hornblendic granite and adjacent highly metamorphosed sedimentary rocks, are found small veins of high grade silver ores with good gold values simi-

lar to the ore described on the "Helen" claim. These veins may yet prove very valuable as work proceeds and cheap transport is provided, but all work was suspended except that being done by the Boundary Creek M. & M. Co., on the west side of the creek.

East of the townsite of Greenwood, owned by C. S. Galloway. Here **San Bernard.** is a vein, strike north 20° east, dip easterly 65 to 80° in the granite and traceable for several hundred feet. The vein is 1 to 6 inches wide of quartz carrying argentite, native silver, galena, copper pyrites and zinc blende, the quartz being coarsely crystalline and with conchy structure. A shaft had been sunk 65 feet to where a flat dipping fault had intervened below which work had not been done to find the vein. On the dump were sacked about 3 tons of ore that were stated to carry from 150 to 180 ozs. silver and \$20 to \$30 in gold per ton. No work was being done. Mr. Galloway also owns an adjacent claim, the "New Alaska," on which is a small, barren quartz vein.

This claim lies north of the above, but was not visited as nothing had been done since 1895, but from a vein, about 12 inches wide, running east and west, about 40 tons of carefully sorted ore were shipped out in 1893, the value of which is said to have been 300 ounces of silver and \$80 in gold per ton. Area, 51.3 acres; title, Crown grant; owned by the Spokane Northern Mining Co.

#### BOUNDARY CREEK M. & M. Co.

This company owns ten claims on the hills west of Greenwood, and several were being developed. Capital stock, \$1,500,000 in \$1 shares.

D.A.—Here is another small vein, 1 to 6 inches wide, of high grade silver ore or quartz with galena, native silver, copper pyrites and zinc blende, assaying over 200 ounces silver and \$10 in gold per ton. There was an open cut 50 feet long on the vein, and an incline of 30 feet to the tunnel being driven in the gneissic country rock. The vein had been followed for 30 feet, where it was 4 to 5 inches wide but, having been faulted, a cross-cut was being driven to find its continuation. A shipment of 4.3 tons in 1894 to smelter, of sorted ore, gave 74.7 ounces silver and 5 ounces gold per ton.

G.A.R.—A shaft 6x10 feet had been sunk 35 feet where a small vein showed on the surface but disappeared, until in the bottom there were about 2 feet of quartz with traces of native silver, ruby silver and blende. Work was to be continued here. The country rock is a greenish, gneissic formation.

O.B.—In the shattered granite along an apparent shear zone, a shaft was being sunk on a small vein, 6 to 10 inches wide, of white quartz, containing a little iron pyrites, but since time of visit, it is reported that some copper pyrites and galena had appeared with some gold and silver values.

No work was seen elsewhere, but other small veins are known to exist, and one large ledge of white quartz, all of which are yet to be tested. Good cabins. Seven men at work. All work has since been stopped on these properties.

This group of four claims lying north of the above company's property and west of Boundary Creek were bonded by E. A. Beilenberg to an **Anaconda Group.** English syndicate, represented by Alfred Woodhouse. A wide zone running north and south of very quartzose rock, heavily iron-stained and carrying, in places, irregular bunches of iron and copper pyrites, was being prospected by shallow cuts and stripings.

Higher up the hill were said to be exposures of solid sulphides or iron pyrites with copper pyrites and small gold values. Very little could be said of this zone until much-needed exploratory work was done, which Mr. Woodhouse had promised would be done on a liberal scale.

**Elkhorn.** Lying south of the "G. A. R."; area, 1,500 x 1,500 feet; owned by C. L. Thormet *et al.* A tunnel had been driven 40 feet along another of these small veins, 12 to 18 inches wide, of quartz carrying a little gold, native silver, galena, and zinc blende. No work was being done.

#### LONG LAKE CAMP.

This camp, embracing the claims located on either side of Long Lake, about seven miles north of Greenwood, by waggon road built during the past season to the *Jewel* claim, presents conditions quite different from any yet described, by reason of the gold-bearing veins of quartz and sulphides in the micaceous schists, quartzites, and eruptive granite. The mountains are

lofty, with steep slopes from the lake, some of the claims lying 2,000 to 3,000 feet above the lake, out of which flows Granite Creek; but, with the exception of the "Jewel" claim, little work other than assessment was being done. These veins are irregular in size, of milky-white quartz, carrying some pyrrhotite, galena, copper pyrites, and on some claims tellurides, first recognized by Messrs. H. A. and G. A. Guess, Greenwood, and since analyzed by Dr. G. C. Hoffman, Geological Survey, p. 10, R. Annual Report, Vol. VIII. On the *Lakeview* claim both altaite, or telluride of lead, and hessite, or telluride of silver, were detected by Messrs. Guess, while petzite, containing 18.79 per cent. gold, was found on the *Enterprise*.

Much of the timber is now gone from many of these claims, but on the lower lying ones there is ample for mining purposes. Good and abundant water power is in Granite Creek, and mountain roads can be built to any property,

The *Jewel* and *Denero Grande*, title, Crown grants applied for, lie 2,500 feet from the south end of Long Lake and seven miles by road from Greenwood, at an elevation of about 3,900 feet above sea level.

This property, under the charge of Mr. Leslie Hill, and equipped with a suitable plant, was being vigorously prospected, there being a 6 h.p. hoisting engine and 15 h.p. boiler (Jenckes Machine Co.) and steam pump. Near the dividing line of the two claims was found a large body of barren-looking white quartz, carrying in spots coarse iron pyrites and galena, in which an 8-foot hole was sunk, all in ore that carries low gold values, but a little to the south, on the *Denero Grande*, a shaft was sunk 19 feet, 7 feet being all in the vein, carrying much copper pyrites and high gold values.

About 75 feet north, on the "Jewel" claim, a well-timbered, two-compartment shaft was sunk 130 feet on the vein that has a trend north and south and a dip east of about 40 degrees, and at 120 feet drifts had been run north 90 feet and south 130 feet. The shaft was begun in an ore-shute, 8 feet wide, of high-grade gold and silver quartz, with coarse iron pyrites, galena, traces of copper pyrites and tellurides. This shute continued for 35 feet, with a width of 4 to 8 feet, excepting for 15 feet, which were 1 to 2 feet wide. Below this is a large body of barren white quartz, 4 to 6 feet wide, but with a 10-inch pay streak at the drift. This quartz continues in the drift north 2 to 5 feet wide. South the vein was 1 to 4 feet wide, with a 12-inch pay streak, and crossed by two narrow dykes that apparently had not dislocated the vein to any extent. This vein is here in a greenish hornblende granite, and at the surface to the north runs for 200 feet until cut off by a large porphyry dyke, beyond which is a large exposure of barren-looking quartz not yet traced out, although 250 feet east is a vein (discovery post here) not traced to the south but for several claims to the north.

Assays by the Guess Bros., of samples from the rich streak ran from \$401 to \$523 in gold and from 106 to 141.5 ounces in silver per ton. The shaft is now being sunk 150 feet deeper, when further drifting will be done.

Owned by the Greenwood Gold M. Co.; lies north of the "Jewel," which vein continues north, out-cropping at several points. On the fractional claim *Enterprise* is a 20-foot shaft and an open cut, where the vein is 2 feet wide, of milky-white quartz, somewhat honeycombed and carrying a little galena and iron pyrites, while on the *Anchor* are two shallow holes showing an irregular, broken quartz vein 1 to 3 feet wide, considerably mineralized with galena and iron pyrites. Timber plentiful. No work being done.

North of "Anchor"; owned by Canadian Gold Fields Co. In the slaty schists are two veins traced out only for short distances, the upper one of which is a vein of barren white quartz, running N. 40° E., while the other, lower down the hill on the regular north and south trend, shows in some small cuts a vein 12 to 20 inches wide of quartz heavily mineralized with iron pyrites and galena. A large porphyry dyke lies close by. No work being done.

It was reported that quartz veins had been traced still further north, but these claims were not visited, as little or no work had been done.

A quartz vein, about 1,500 feet east of and nearly parallel to the "Jewel" vein, out-crops on several claims, at least these out-crops are thought to be along the same vein.

The "Gold Drop," owned by L. Bosshart and F. Dittmer, area 1,500 x 1,500 feet, has an exposure or "blow-out," 20 feet wide, of white quartz carrying very little sulphides. Some very fine samples of free gold were found near the surface, where a shaft was sunk 22 feet, the vein narrowing down to 10 to 20 inches. Two hundred feet away another small shaft was



sunk, where a little quartz was showing, and assessment work was being done to trace out a small vein running east and west. This claim, staked off in 1895, is the oldest in this camp.

This claim and the "Cairngorm," fractions, lying north of the "Gold North Star. Drop," were bonded to Leslie Hill, M. E., for \$12,500. At an elevation of about 4,600 feet above sea-level. In shaft No. 1, 60 feet deep, is seen a vein 2 to 3.5 feet wide, dipping east 60° in the schists, of white quartz with a streak of galena and iron pyrites along the smooth hanging wall. Shaft No. 2, 40 feet south, was down 20 feet, to where is a body of the white quartz 1 to 8 feet wide, lying much flatter. On the surface near by, the vein is 4 to 5 feet wide, of reddish white coarsely crystalline quartz, with some sulphides. Good gold assays had been obtained from this vein, and Mr. Hill then contemplated giving this property further testing, with results not known to the writer.

Lying north of "Cairngorm," a small quartz vein showed in a 10-foot hole. Owned by R. Wood *et al.* Here the rocks are seen to be highly metamorphosed sedimentaries or schists and gneisses, with a strike east and west, across that of the veins.

Many other locations have been made on these hills, but the above are the chief ones with any work done.

#### OTHER CLAIMS.

The following claims were not visited by the writer, but the following information was gleaned from very reliable sources:—

*Roderick Dhu.*—About 1,000 feet above and one mile west of the lake, and two miles by trail northerly from the "Jewel," owned by Messrs. R. Wood, J. B. Jones *et al.*

(a.) *Vein No. 1*, 2 to 14 inches wide, not traced far, of quartz with galena, iron pyrites and tellurides, has a 50 foot shaft, from which, at 10 feet, Mr. J. C. Haas took a sample that assayed \$80 in gold, and \$20 in silver, while an average sample by Mr. Guess, gave \$100 per ton.

(b.) *Vein No. 2*, of barren-looking white quartz 4 to 6 feet wide can be traced throughout the length of the claim, but little or no work has yet been done to explore it.

*Lake View.*—Owned by C. L. Thommet, R. and H. Wood, Greenwood, lies about 2,000 feet north-east of the "Roderick Dhu." A 100-foot tunnel starts in on a vein of white quartz that carries a good percentage of galena, pyrrhotite, iron and copper pyrites, and the tellurides mentioned above. The vein varies greatly in width from nothing to 3 and 5 feet, and very little is showing at present in the face. A shaft has been sunk 35 feet near the tunnel mouth, exposing a vein 18 inches wide of quartz, with a great deal of pyrrhotite, which is stated to give high assay values in gold and silver. The vein has not been traced on the surface any distance.

*Amanda.*—Owned by Chas. Collier *et al.*, lies 1,500 feet south-west of the "Roderick Dhu." At the south end of the claim is a vein 15 to 18 inches wide, of quartz with galena, blende and pyrites out-cropping at one place, while at the north end is another out-crop 4 feet wide, of barren-looking quartz, and small shafts have been sunk on each of these exposures.

*Alice*, north of "Amanda" claim, owned by Sir Charles Ross, Nelson, has a vein traced for 200 feet, 12 to 18 inches wide, of quartz with galena and pyrites, and also pyrrhotite, which, according to assays made by Mr. H. Guess, always runs high in gold and silver. Small shaft.

*Electra.*—Owned by R. Wood *et al.*, has a vein four to ten inches wide of quartz, with galena, pyrites, etc., assaying well in gold. Two assessments done.

*C. O. D.*—Owned by Chas. Colliers *et al.*; quartz vein, two feet wide; one mile west of "Rhoderick Dhu." Quartz carries some gold values.

*Agnes.*—Lies south, but separated by the fractional claim the "Lady of the Lake" from the "Roderick Dhu." Here is a quartz vein carrying very little sulphides, but traces of silver telluride (?) reported to be traceable by different out-crops through this and the two claims just mentioned, and to be lying between much twisted schist and quartzite. Little or no work done.

#### SKYLARK CAMP.

This camp lies two miles east of Greenwood, between the Wood's and Greenwood Roads, on a road connecting these two. Here has been found ore quite different from any found in this district, but little work has been done except on the "Skylark." Timber is plentiful, and roads can be easily constructed to any claim.

This claim, area 900 by 1,500 feet, and the *Denver*, 600 by 1,500 **Skylark.** feet, are owned by G. Lavaguino, Colorado; manager, Chas. E. Rueger, Greenwood. This property was bought for \$15,000. At time of visit (June 27th) the means of hoisting water had given away and water was in the workings, but a small vein runs north and south, and dips east 45 degrees, is a greenish, light-coloured massive rock somewhat stratified. An incline, equipped with horse-whim for 80 feet, followed the vein, which was 1 to 12 inches wide of nearly solid mispickel, carrying some fine grained galena and zinc blende and high silver values, although parts of the vein carried nearly clean galena that assayed the highest in silver. At the bottom of this incline the vein was faulted, and a cross-cut had been driven 110 feet, and also 2-300 feet of drifts, but no ore was, it was stated, in sight. On the dump were about 15 tons of first-class ore which, sampled and assayed by Mr. Rueger, gave 250 ounces silver and 1 ounce gold per ton; also several tons of poorer ore running 50 to 60 ounces in silver. This autumn all work has been stopped on these claims.

The *Denver*, lying to the north, shows in several open cuts a small quartz vein, assaying 25 to 30 ozs. in silver, but this vein dips to the west, and up to time of visit had not developed any size or values.

The *Silver King*, 1,500 by 1,500, lying west of the *Denver*, owned by John Douglas, Midway *et al.*, has a small vein of quartz with a little mispickel, galena and blende, traceable by means of small open cuts for 200 feet through a heavily iron-stained, fine-grained but somewhat stratified rock, but no real work has been done here yet to prospect this showing. This veins also runs north and south, and dips east 60°, and is said to carry small silver values.

The *Last Chance*, traversed by Wood's road, lies one mile north from the "Skylark," and was owned by Geo. Cook, *et al.* Work was suspended, but a shaft had been sunk on a very small vein of quartz carrying a little mispickel and galena, that dips easterly at an angle of 45°, but flattens to 20°. Some gold and silver is in this ore, and work was to be resumed.

Area, 920 x 1,500, title Crown grant applied for, located near road and half a mile south of Greenwood, owned by the Boundary-Helen Gold Mining Company; capital stock, \$300,000; Secretary, G. T. Hodgson.

In gneiss and quartzite, in close proximity to granite, is a vein, strike north and south, dip E. 60°, 6 to 16 inches wide of gold-bearing quartz, with galena and blende. This vein can be traced for over 1,000 feet, and cuts across the stratified formations and also apparently through the granite. An opening 29 feet long and 25 feet deep shows this small, but well mineralized vein under a smooth hanging wall, with at one place a streak 4 inches wide where the vein was 8 inches in width, that gave an assay of 7.6 ozs. of gold, 64.6 ozs. of silver, and 33 % lead, while 10 tons of sorted ore sent to the smelter on January 24th, 1895, returned \$36 per ton, or, gold 1.45 ozs., silver 28.8 ozs., lead 8.9 %. These returns were submitted by Mr. Hodgson. No work was being done, but on further development, if a milling process should be deemed requisite, there is ample water supply close at hand.

*Other Claims*—Several other claims were visited, such as the *Nightingale*, on which Wm. Christie had done, unaided, considerable work, but with no encouraging results, although he deserves success for his indefatigable endeavours to prove up his property.

#### GREENWOOD CAMP.

The group of claims, spoken of as the "Greenwood Camp," lies on the summit of the watershed (elevation 4,700) between Boundary and Fourth of July Creeks, six miles east of Greenwood, and all of the chief claims lie near Wood's road, from Greenwood to Grand Forks. As the dividing line passes along this summit, such claims as the *Snowshoe*, *Gold Drop*, *Monarch*, *Rawhide*, etc., are in the Grand Forks division, the *Stemwinder*, *Brooklyn*, *Old Ironsides*, *Knob Hill*, *Idaho*, *Gray Eagle*, *War Eagle*, *Missing Link*, etc., in the Kettle River division.

Nearly all these mountains, well rounded and low-lying, are heavily timbered. If a large mining camp is yet developed here, it will not be difficult to run a railroad to a convenient point, and such will be necessary (if these ores are to be concentrated) to transport cheaply the ore to the water supply, two or three miles distant.

*Ores*—The ore of this camp is essentially, as yet, a low grade gold-bearing yellow copper, disseminated with hæmatite and some calcite through altered greenish fine-grained eruptive rock, but massive magnetite iron ore bodies have been found along the apparent trend of leads in which is the copper ore. Since the time of visit (June), several of these claims have passed

into strong hands, and this winter these large mineralized out-crops are being more thoroughly tested to see if ore-bodies here exist more concentrated and containing higher values. If such are found, this ore should be well adapted for smelting, and interesting problems in concentrating may yet present themselves as this very interesting camp is carefully explored.

This claim was purchased in 1894 by Farrel & Midgeon, of Butte, for **Stemwinder**. \$15,000, but recently sold to McKenzie & Mann, Toronto. Area, 20.6 acres, title Crown grant. Strike of lead, north and south; dip, east 70°. At this property work had been suspended, and water was in the lower workings that are close to the main road, and, locally, this is thought to be one of the most important claims in this camp, but little could be learned except from what was to be seen on the surface. The ore consists of gold, yellow copper pyrites, and hæmatite in greenish feldspathic eruptive rock, the copper in the ore on the dump running from 3 to 5 %, while good gold assays are obtained.

This ledge is thought to be the continuation of that on the "Old Ironsides" claim. The work done consisted of (a) a 60-foot shaft equipped with a horse-whim, a cross-cut with incline 30 feet deep, exposing some ore; (b) a 60-foot cross-cut tunnel to tap these workings, but not in far enough; (c) a 30-foot shaft 40 feet west of (a), in which was some low-grade copper ore; (d) a 40-foot shaft (full of water) 300 feet north of (a) is said to have followed ore to this depth, while ore was in (e), another shaft 40 feet distant, about 80 feet deep. Nothing more definite can be said of this property, but on the dump was seen a pile of ore that would run from 3 to 5 per cent. in copper, with gold assay values said to run from \$12 to \$134, but much more development work is yet needed before it can be known what this mineralization by gold and copper may lead to in depth.

The above owners are also interested in the *Montezuma*, that lies north of the Stemwinder, and in the fractional claim to the south, the *Phoenix*, which lies between the Stemwinder and Old Ironsides. This winter, Mr. J. E. Boss has begun the more thorough exploration of these properties.

On this claim, title, Crown grant; area, 20.18 acres, lying south of **Old Ironsides**. "Stemwinder" and "Phoenix," is a lead running north and south, from which, in a 75-foot shaft (full of water) some ore has been taken or magnetite, hæmatite, copper and iron pyrites. Some shallow holes are apparent in the same ledges, but near the south end of the claim. Since time of visit, prospecting has been resumed. Timber good and abundant.

Lying immediately south of the "Old Ironsides," on this claim, title, **Knob-Hill**. Crown grant; area, 600 by 1,500, this north and south ledge shows a large body of magnetite iron ore, in which is an open cross-cut nearly 100 feet long, and 3 to 10 feet deep. The ore-body is here fully 50 feet wide, of nearly solid, fine-grained magnetite, carrying a very small percentage of copper and some quartz and calcite in the same altered eruptive rock. Narrow bands of quartzose rock, with some yellow copper, traverse this body of iron along the line of strike. Small openings show the continuation of this mineralized zone to the south, but with a much narrower width of ore.

Again we are confronted by the fact that too little has yet been done to show the true significance of this large ore-body, in which are, apart from iron ore, very small values in gold and copper, as will be seen in the samples taken and assayed by Mr. Guess, whose results were kindly submitted by Mr. Graves, i. e. :—

(1.) Nine feet of magnetite ore gave \$2.75 in gold, 9 ozs. silver per ton, 3.8 % copper, 57.6 % iron, and 7.5 % silica.

(2.) Twelve feet gave \$1.12 in gold, .6 ozs. silver per ton, 1.9 % copper, 46 % iron, and 22.3 % silica.

(3.) Twenty feet gave \$1.50 in gold, 4 ozs. silver per ton, 1.82 % copper, 36.9 % iron, and 29.3 % silica.

A general sample across the whole ledge gave (not assaying for gold or silver) 37.8 % iron, 30.8 % silica, and 6.3 % lime.

Hence this ore exhibited in this surface cut will make valuable material for fluxing in smelting, and further work, since resumed, may yet disclose higher values in gold, silver, and copper in this ledge, about which so little is really known.

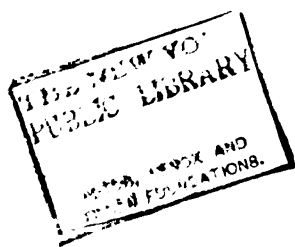
Good timber plentiful; claim three-fourths of a mile from the road, and owned by the Knob-Hill Gold Mining Co.; capital stock, \$1,500,000; president, F. P. Bucke, Sherbrooke, Que.; general manager, J. P. Graves, Spokane, Wash.



FAULTED END OF THE "CARIBOO" VEIN.



STAMP MILL, "CARIBOO" MINE, CAMP MCKINNEY.



*Gray Eagle*, south of "Knob-Hill," owned by J. Stevens, Fairview *et al.* In an open cut 20 feet long, 4 to 8 feet deep, was seen the same eruptive rock, impregnated with hæmatite and copper and iron pyrites, but no solid sulphides were in sight. Near the end line of "Knob-Hill," were two shallow shafts in very much decomposed iron-stained rock.

*Idaho*, west of the "Phoenix" and "Old Ironsides," owned by Geo. Rambarger, D. McLaren, Greenwood, *et al.* Here a band of rusty, broken rock with hæmatite, yellow copper, a little quartz and calcite occurs along a line of fracture running north and south, and dipping east 45°. A shaft 27 feet deep (in water) disclosed some ore that gave values in gold and copper, but more work is much needed. Timber good on all these claims.

*War Eagle*, south-east of "Knob-Hill," owned by R. Denzler *et al.* In an open cut in copper-stained eruptive rock is a large body of solid magnetite with very little copper and iron pyrites, running north and south, carrying small gold values. About 300 feet away a 25-foot shaft had been sunk in a dark green diabasic rock, where some hæmatite and copper pyrites were visible, but no ore of any account had been discovered. Timber plentiful.

*Missing Link*, a fractional claim owned by H. Morgan and Geo. Rambarger. In an open cut can be seen a large body of solid fine-grained magnetite, with a very small amount of copper and iron pyrites.

The workings on this claim are close to the main waggon road, three-fourths of a mile east of the "Stemwinder." On this property and the adjoining "Gold Drop," are large out-crops of mineralized eruptive rock that have attracted much attention, and may yet prove very important as proper development is done. On this claim some work has been done in two places, and south of the road is seen a zone from 30 to 50 feet, of light green feldspathic rock carrying much hæmatite or specular iron and some copper pyrites. Low gold values are also present, and it is said fine free gold has been panned out of the rotten surface material. There is considerable calcite in this zone, which, apparently from the limited amount of work, dips to the east at a not high angle, as a diamond drill hole at 10 feet entered, and in 30 feet passed through a body of this heavily mineralized rock, which ground up into sludge, and did not give a solid core, while a second hole 40 feet west of this, is claimed to have started in mineral, and after passing vertically through 54 feet of this material, entered barren rock.

South of this, 400 feet, open cuts and drill holes have shown this mineralized rock there. So far this material has proved to be of very low grade, assaying from \$1 to \$11 in gold per ton, and 1 to 5 % copper, but if exploration in depth of this strongly mineralized zone betrays bodies of better grade ore, as it is very suitable to smelting, very important ore-bodies may yet be found to underlie the surface showings. The owners, R. Denzler and Wm. Gibbs, Greenwood, lately bonded the claim to Mr. P. Clark, of Spokane, who has ordered a complete plant from the Jenckes Co., Sherbrooke, Que., and will explore this property in somewhat the manner it deserves.

Mr. F. C. Innes, Vancouver, has purchased for the Montreal and B. C. **Gold Drop.** P. and P. Co., this claim lying west of the "Snow Shoe." Considerable work has been done, especially with the diamond drill, but not enough to yet show the trend or dip of this zone, also mineralized with yellow copper and hæmatite and carrying gold, which has an east and west trend along a large body of grayish porphyry. To the east a tunnel has been run in over 120 feet in a southerly direction, in which there is much solid copper and iron pyrites, and also mixed ore with much calcite. At 120 feet, what resembles a fault-wall was struck, beyond which the rock, here a regular agglomerate, is barren.

Considerable prospecting was done with the diamond drill, with the result that a large amount of ore, reported to be worth \$10 to \$14 per ton, was thus found. No work is now being done.

On this claim, lying south of "Snowshoe" and "Gold Drop," is a **Rawhide.** zone, with an apparent trend north and south, of diabasic rock, mineralized with chalcopyrite (or copper pyrites), calcite, but very little hæmatite. An open cut, 6 to 12 feet deep, discloses nearly 50 feet of this copper-bearing material, which will, as so far shown, have a low average copper percentage; but this surface showing will justify much more extensive and careful development work. Mr. Gibbs, from samples taken by himself, has got from \$3 to \$18 in gold and 2 to 3 ounces of silver per ton, and these values do not seem to be dependent upon amount of copper present. Along the trend of this zone the surface is more or less copper-stained. Owned by D. McInnes, Thos. Tighe, R. Denzler, and Wm. Gibbs.

*Curlew*, a fractional claim, on which appears the continuation of this zone, that may cross one corner of the "Snowshoe."

*Monarch*, owned by Thos. Humphrey; lies south of the "Gold Drop." In iron-stained, decomposed rock a shaft was sunk 75 feet, where a small vein of yellow copper ore showed at the surface.

This claim, area 600 by 1,500, located in 1891, owned by G. W. Ramberger, Jos. M. Taylor *et al.*, and lying west of the "Stemwinder" and "Montezuma," possesses a strong ledge, running north and south along a smooth wall of marbleized limestone, dipping east nearly vertically. The ore, lying in a highly stratified greenish rock, is chalcopyrite, feldspar, calcite, and a little hæmatite finely laminated, with as yet small gold values.

Considerable prospecting has been done:—(a) An open cut showing 20 feet of mineralized but decomposed rock, the dirt covering of which is said to have shown fine colours of gold on panning: (b) North 100 feet and up the hill is a 27-foot shaft along the steep lime wall, all in this fine-grained, banded ore, samples from which, assayed by the owners, gave 3 to 4 per cent. copper, \$3 to \$5 in gold, and 1 to 3 ounces of silver per ton. There was water in this shaft, but further work was to be done here, as depth showed decided improvement in the quality of the ore: (c) North 100 feet is a small cut showing 12 feet of light-coloured quartzose rock, carrying no sulphides, but said to have gold values. Farther up the hill two small openings showed the same stratified rock, but slightly impregnated with copper pyrites. To the north lies the *New York*, just being prospected, to the south the *Idaho*, already described.

#### SUMMIT CAMP.

This camp, lying at the head of Fisherman Creek, is two miles by trail from Greenwood and about eight by road, completed this fall, from the town of Grand Forks. It is in the Grand Forks recording division. Here again the mineral deposits lie in the altered eruptives, in which are isolated areas of crystalline limestone and bosses of granitic rock. The mountains are rounded, not high, and have little timber on their summits, and fires have devastated much of the thick forests on the slopes.

Title, Crown grant; area, 51.65 acres; owner, W. A. Corbett *et al.*, **Oro Denero.** Greenwood. At one point an 8-foot hole had been sunk in a large body of magnetic iron, carrying a very small amount of copper pyrites, here nearly 30 feet wide and trending north and south. Several hundred feet south another 8-foot hole showed 4 to 5 feet of mixed quartz and country rock, impregnated with yellow copper pyrites and traces of bornite. In other shallow cuts along the strike (N. 20° W.) was seen copper-stained rock with small stringers and splashes of copper pyrites. No work was being done. Fair amount of timber.

This group, comprising the *Emma*, *Minnie Moore*, *Mattie Davis*, **Emma.** *Jumbo*, and *Mountain Rose*, owned by Farrel and Midgeon, Butte, are reported sold to Messrs. McKenzie and Mann, Toronto, gentlemen of very strong financial standing.

*Emma.* Crown-granted; area, 48.5 acres; lies north of the "Oro Denero," and possesses a large body of massive, fine-grained magnetic iron, with traces of copper and iron pyrites, and, it was reported, some gold and silver values. This ore body occurs in the diabasic rock at its contact with a small area of hornblende granite, and in places were coarsely crystalline magnetite, garnet, and calcite. A shaft 107 feet deep (nearly full of water) had a cross-cut, said to run for 27 feet through this iron ore. Timber plentiful. The other claims in this group were not visited, as no work was being done.

Situated on trail, about one mile south-east of "Emma"; owned **R. Bell, Aspen.** (June) by J. Keoughs, O. R. Butts *et al.* On the *R. Bell*, considerable work had been done, but, being full of water, little could be seen except that at the surface. (a) Main shaft, 70 feet deep, was sunk in country-rock to strike the ledge that runs north and south and dips E. 60°: (b) A 30-foot shaft and 16-foot cross-cut showed mixed ore, or a small amount of yellow copper pyrites with a little zinc blende and iron pyrites in the dark green diabasic eruptive. A small gold value or \$2 to \$3 is said to be present; also high silver values in the samples of solid sulphides: (c) A small open cut shows slight mineralization. Near by is a large exposure of massive magnetite, with very little or no copper. There is here much limestone traversed by dykes and sheets of eruptive rock. Elevation about 3,200 feet above sea level.

**Cordick.** Area, 51.65 acres ; title, Crown grant ; situated north of "R. Bell" ; owned by Capt. R. C. Adams, Montreal. On this claim a small shaft had been sunk, where some copper pyrites were seen interspersed with the eruptive country rock.

**B. C.** This claim had been but recently discovered by J. Keoughs *et al.*, about one-half mile north of the "Cordick," and at an elevation of about 3,800 feet, but with only two shallow trenches dug, it was one of the most promising prospects seen in the district, as in one of these cuts, with one wall of limestone, was seen the highly-decomposed iron-stained surface ledge matter below which, for a width of 20 feet, was mixed ore or copper pyrites in the light green feldspathic rock, with considerable of the solid copper ore. A small stream was close by and Loon Lake lay about 1,200 yards distant and 820 feet lower in elevation. Since then the claim has been bonded for \$60,000. Cabins, etc., have been erected and a shaft is being sunk in mineral. A steam plant has been installed, and 26 men are now engaged vigorously opening up this claim.

*Other Claims.* Many other claims have been staked off in this locality, but very little work was being done, or had been done.

#### WELLINGTON CAMP.

The Wellington Camp in the Grand Forks Division lies about 2 miles south of Greenwood Camp, 7.5 miles from the town of Greenwood and 14 from Grand Forks. The waggon road between these two places passes close by all the workings on these claims. The country here comprises well-timbered, low-lying hills sloping down to Fourth of July Creek, and again is seen the greenish feldspathic country rock with irregular areas of limestone and some large bosses of the highly crystalline granitic rock, probably diorite.

**Golden Crown.** Area, 51.65 acres ; title, Crown grant ; owned by the Brandon and Golden Crown Gold Mining Co., Limited, Rossland ; capital stock, \$1,500,000 ; President, Hon. T. M. Daly ; Superintendent, S. H. Collins, Greenwood.

This property is being vigorously developed, and more of such work would rapidly show up the true worth of this large district. There has been found a number of, as yet, small veins in the same eruptive rock, in which the ore is gold-bearing copper pyrites and pyrrhotite in a quartz gangue. The main tunnel (June 22) was in 60 feet and was being run to cut five of these veins, with 280 feet to go to tap a vein, No. 2, on the top of the hill at a depth of 80 feet. One vein, No. 1, of this kind of ore described, 10 to 12 inches wide, had been crossed. A shaft had been sunk 60 feet on vein No. 2, which was 1 to 20 inches wide, of decomposed quartz and the sulphides from which high gold assays had been obtained, and the enclosing country rock was somewhat mineralized and also assayed a little in gold. Thirty feet south of No. 2 is vein No. 3, a small vein of quartz and sulphides exposed in a small cut. Near the road vein No. 5, as shown in a long trench, was 3 to 4 feet wide, of quartz, copper and iron pyrites and pyrrhotite, good samples of which have assayed \$35 per ton in all values. It was proposed to sink a shaft here, and this is now down about 30 feet.

Mr. Collins kindly submitted the following assays of average samples : Vein No. 1, gold, \$1.65 ; silver, 2 ounces ; copper, 6.1% ; Vein No. 5 (at the road) gold, \$8.26 ; silver, 1.1 ounces ; copper, 2% ; Vein No. 3, gold, \$2 ; silver, 1.5 ounces ; copper, 8% ; Vein No. 2, gold, \$12.81 ; silver, 5 ounces ; copper, 8.2%. Much higher assays have been got, but these will give some idea of the ore as found at the surface. Good cabins had been built, and the Boundary Creek "Times," October 15th, states that adequate hoisting and pumping machinery has been ordered to sink 500 feet. No. of men employed, 13.

**Calumet.** This claim lying east of the "Winnipeg" was under bond to this company, and prospecting had disclosed a small vein, a few inches wide, of quartz and sulphides near the diorite mass, supposed to be the extension of the "Winnipeg" vein.

**Winnipeg.** Title, Crown grant ; area, 26.7 acres ; lying along the south line of the "Golden Crown." Owned by D. McIntosh *et al.*, since reported sold to a company. This property has attracted much attention, but little can be said as work was suspended and, the workings being flooded, could not be entered. However, openings have been made on two parallel leads 75 feet apart, traced only for short distances on a trend of N. 70° west in the usual feldspathic rock but near the large exposure of highly crystalline rock or diorite.



*Small Vein.*—From 1 to 12 and 16 inches wide along a well defined line of fissuring of nearly solid iron pyrites, with traces of mispickel and copper pyrites, assaying \$12 to \$15 in gold, exposed in a 15-foot shaft and small open cuts.

*Main Vein.*—Here there is small shaft 35 feet deep with a cross-cut of 17 feet close by 59 feet deep with cross-cut. On the dump the ore is seen to be either copper pyrites and pyrrhotite in quartz, stated to assay as high as \$50 in gold per ton, or solid pyrrhotite assaying \$9 to \$15 in gold. This veins here shows for 100 feet, and is supposed to be the No. 4 vein showing on the "Golden Crown" 350 feet to the west. Considerable ore was on the dump, and some had once been sacked for a trial shipment, but nothing had been done here for two years. Work on a good scale is now being conducted by a company in control of this property.

#### OTHER CLAIMS.

Of course many other claims are here located, but little work has been done on any, and none on many.

*Keystone* claim, owned by Jos. Taylor *et al.*, located near the forks of the road, showed a decomposed iron-stained rock with small stringers of iron pyrites and pyrrhotite.

*Sinbad.*—Area, 1,500 by 1,500, owned by J. Fraser *et al.*, lying 1,500 feet north of "Golden Crown." Small vein running east and west (same direction as "Golden Crown" vein), 12 to 20 inches wide of decomposed, honeycombed quartz with iron pyrites. Good cabins had just been erected near a small shaft 20 feet deep.

#### PASS CREEK.

Considerable prospecting and a little work was being done on Pass Creek and its tributaries, where deposits of nearly solid pyrrhotite, carrying very small gold or silver values, are found.

#### MAIN KETTLE RIVER.

This year there was a rush of prospectors up the main Kettle River from Rock Creek, and a good many claims were pegged off, mostly on silver-galena veins, but only some properties were seen at "Crown Point Camp," six miles up the west side, by road from Rock Creek. Up the valley are seen both the highly altered sedimentary rocks and granites, but these claims were located on veins in the same greenish feldspathic eruptive rock found all through this region.

*Crown Point.*—Elevation 3,000 feet, or 900 feet above Kettle River, owned by Jno. Douglas *et al.* In a very small isolated patch of the crystalline limestone, surrounded by the eruptive rock, a shaft 25 feet deep was being sunk in a body of scattered galena, iron pyrites and blende; narrow stringers of galena traverse this mass of limestone, but no definite trend could be seen to this ore body, nor had it been traced for any distance or outside of the limestone.

*Number Three.*—A very narrow stringer of galena ore was seen near the line of contact of eruptive with the altered sedimentary rocks.

*Sophia Sherron* and *Number Two*, near their dividing line, each claim had a small hole sunk on a vein 1 to 2 feet wide, traceable for a short distance, of honeycombed quartz carrying coarse cubed galena. These claims are all well timbered.

#### GRAND FORKS—BROWN'S CAMP.

At the junction of the North Fork and Main Kettle River, in a wide valley in which are several fine fruit and grain ranches where irrigated, the incorporated town of Grand Forks has grown rapidly, but at the present time everything is very quiet here pending the coming of a railroad. Quiet a number of claims had been staked off near by and some work was being done, but only some properties in Brown's Camp, about ten miles by road trail up the North Fork, were seen. Most of this country is well timbered, and the North Fork has fine water powers.

**Volcanic.** The *Volcanic* and *Iron Cap*, located on a bold bluff east of the river, presents an enormous showing of deep red and brown decomposed iron-bearing rock, or gossany material, that can be plainly seen at the distance of several miles. On examination it proves to be a large area of this greenish feldspathic rock, impregnated with a large amount of pyrrhotite, which on decomposing has formed this gossan,

often a foot deep of soft, sintery mass. Part of the band of the crystalline limestone has been involved in this eruptive rock, which in turn is crossed by several dykes, and on the face of this bluff two areas, each over 500 feet wide, run up for over 1,000 feet.

Very little work has been done in this mineralized rock, that makes a remarkable landmark, except some shallow holes that show the solid pyrrhotite-impregnated rock, but near the foot of the bluff a tunnel has been run in 345 feet without entering this mineralized rock, so, practically, little or nothing has yet been done to prove the existence or character of the ore-bodies that might underlie this great out-crop. So far, very little copper sulphides have been found in this mass, and only very small assay values in gold are obtained. The owners, Mr. Brown *et al*, bonded this property to the Olive Mining and Smelting Company, but no work, other than assessment, was done during the past year. Capital stock, \$20,000,000.

Elevation, about 3,200 feet. This claim, owned by the Pathfinder

**Pathfinder.** Mining, Reduction and Investment Company, Secretary, James I. Walker, Grand Forks, lies about 2.5 miles northerly from the "Volcanic." The country here is bare and very rocky, i. e., gneisses, granites, syenites, etc. In a boss of the greenish, eruptive rock a few open cuts trace out a zone mineralized with pyrrhotite for about 1,500 feet, and a shaft 5 x 7 feet had been sunk 30 feet, where massive pyrrhotite was found in irregular masses and stringers. This ore carries very little copper, but assays are reported of \$8 to \$56 in gold, and 2 to 12 ounces in silver per ton. Good cabins had just been erected, and development was in progress.

*Standard*, lying east of "Pathfinder," shows the iron-stained rock, but no ore as yet. A little work was being done.

*Tiger*, south-east of "Standard, shows some pyrrhotite.

*Hidden Treasure*, east of "Tiger," shows some quartz with pyrrhotite.

*Diamond Hitch*, south-west of "Pathfinder," owned by F. Ralston, *et al* has a considerable amount of solid pyrrhotite, on which five men were working. No values of this ore could be ascertained.

This claim, and three others, owned by the Seattle Gold Mining and Milling Company, capital stock, \$6,000,000, lies on the west slope of the North Fork, about eight miles by road from Grand Forks, and two to three miles south of the "Volcanic." The formation here is very highly altered stratified rocks, rendered quite crystalline in structure, and running parallel with this stratification were three or four bands from a few inches to 2 or 3 feet wide, mineralized with magnetite and a small amount of copper and iron pyrites, but in the small amount of work done very little ore of any kind was seen. The timber here is plentiful and good.

*Wolverine*, *Humming Bird*, and *Miami*, also located in this district, were not seen, but assessment work had been done when some pyrrhotite and chalcopyrite were exposed.

#### CHRISTINA LAKE DISTRICT.

Considerable prospecting has been done here during the past two years, but no reports could be got other than of finds of very low grade sulphides, and this district was not examined.

#### OSOYOOS DIVISION.

##### FAIRVIEW CAMP.

Fairview Camp is located about 2½ miles west, and 500 feet above the Okanagan River, on the east flank of the rather low range of mountains separating the Okanagan and Similkameen Valleys, and by stage-road is 28 miles south of Penticton, 29 miles west of Camp McKinney, and 12 miles north from Osoyoos, where were the offices of the Gold Commissioner of the southern portion of Yale.

The mineral claims so far at all developed lie on a series of foot-hills or benches, a few hundred feet above the Okanagan Valley, down on a flat in which, below the narrow gulch in which the settlement now is, a townsite is laid out, where one of the mining companies has since erected a large hotel. Nearly all the claims are very easy of access by road or trail, but work is now confined mostly to the operations of the "Tinhorn" and "Sinuggler" Companies, and the "Joe Dandy."

## GEOLOGY.

The veins for the most part lie in a series of very highly metamorphosed stratified rock, consisting in most part of very quartzose schists, quartzites and some gneisses, separated into two areas or belts by a narrow spur of syenite granite that runs south-easterly down the gulch from the main area of granite, which is very predominant all through this part of the district. On either side of this spur the stratified rocks dip away from the eruptive rock, but conform in strike, especially on the northerly side, with the trend of the spur. The northerly area in which are the oldest claims, such as the "Stemwinder," "Morning Star," the Strathyre properties, etc., etc., is from one to one and a half miles wide between its granite confines, and comprises mostly quartzose schists and some slates and gneiss, while the southerly belt where work is in progress on the properties of the Tinhorn and Snuggler Mining Companies, consists mostly of quartzite, with some quartzose schists extending, it is supposed in a large area, up to the summit of the mountain. The granite is mostly light-colored or greenish, with a silvery white mica, but in the spur above mentioned is practically a syenite, very little quartz showing.

## THE VEINS.

Quartz veins occur both in the granite and in the stratified rocks, and may be thus classified and described :—

(a.) *In the Granite.*—So far as developed, the veins in this rock have proved very limited and uncertain, in that on most of the claims only isolated exposures of quartz have been found that can be traced only a short distance along the strike, or two or three disconnected exposures may be uncovered by stripping; however, but very little work has really been done on such claims, other than sinking shallow shafts on these exposures. On the "Columbia," located on the spur, a quartz vein has been traced almost continuously for the length of the claim, but on the "Susie," not examined, there is said to be a single exposure of white quartz, with some sulphides in places, 25 to 30 feet wide and 94 feet long, but with no further extension along the strike, although more extended prospecting may yet disclose its continuance in the granite.

(b.) *In the Schists and Quartzites* by far the most important quartz ledges are located, and with a few exceptions, all such veins conform strictly with the stratification of the formation, both in dip and strike, lying without any gouge-matter tightly against the country-rock, from which, however, the vein matter breaks off clean on shooting. There are several veins in this belt, five being reported on the "Stemwinder," a claim 600 feet wide, and same can be traced almost continuously for several thousand feet, but varying much in width, often 5 to 6 feet wide, then suddenly widening out to 10 and 12 feet, and even 20 or 30 feet, to as suddenly narrow down to a few inches or a very slight trace, this rapid increase in width occurring also in depth, as seen on the "Brown Bear" (see illustration), where the vein five feet wide on top increases to 18 in depth of 60 feet. The quartz in the veins always has an apparently stratified structure or plans of cleavage parallel to the walls. Faulting is evident in some of the properties but dislocations greater than a few feet were seen only in one or two places. The veins cutting across the formation have not been traced as yet for any distance, except perhaps in the "Wide West," where the vein appeared to cross the dip of the stratification at a high angle, with considerable gangue along the vein, and especially along the smooth wall where the vein was pinched or barren of quartz.

## QUARTZ.

Nearly all the gangue is a milky-white, semi-translucent, very compact quartz, weathering white on the surface. Some sulphides occur, such as iron pyrites, galena, blende, chalcopyrite and pyrrhotite segregated at times in bunches, oftenest near the foot-wall, but very scantily scattered through the bulk of the vein, which will consist of almost perfectly free-milling quartz, so that if treated en masse the percentage of concentrates would be from  $\frac{1}{2}$  to 1 per cent of the whole, but in the case of the large bodies of quartz the percentage would likely be even less. From the 2,700 tons milled from the "Morning Star," about 1 % was saved by the vanners. Free gold is often found, and fine samples have been broken out; good prospects can often be got by crushing and panning samples, while the highest assays are obtained from the quartz most mineralized.

In the southerly area, as in the Tinhorn and Smuggler properties, some of the quartz is white, but much is of the bluish-white character often distinguished with difficulty from the adjacent quartzite, which is also impregnated to some degree with pyrites. Tellurium and tellurides are said to occur in this ore, but no tests have been made to ratify this in this office.

#### VALUES IN THE QUARTZ.

Although a very large amount of quartz, probably one of the largest showings in the Province, is found at this camp, it is difficult to arrive at its probable average value, although some idea can be reached by the bullion returns for the 2,700 tons of "Morning Star" ore, which was milled without sorting and yielded per ton \$11 by amalgamation and \$.92 in the concentrates.

It is not believed by those who have made many tests, however, that the ore of the camp will average such values, that from \$4 to \$7 per ton will be found to be much nearer (if not even too high) the gold contents of these large masses of quartz; and, in any case, to become profitable, this ore will have to be mined and milled in very large quantities after the best and cheapest methods of mining, transportation, and milling, and that a company having a mill of large capacity on the Okanagan River, where only is sufficient water, will have to control several claims, so as to be able to mine a large tonnage of ore.

Other mill-runs have been made, such as from the "Rattler," "Brown Bear," "Wide West," and "Joe Dandy," but returns from such are not available. During the past year, new companies have acquired or located property, now being developed, from which high *assay* returns have been got, but it is yet too soon to decide as to the probable extent of ore-bodies or *production* values, as the amount of underground work is as yet very small and mill tests are wanting, assay returns on samples being a very unsafe criterion, in fact wholly unreliable.

However, these large bodies of low-grade gold-bearing quartz invite the careful investigation of those prepared to undertake mining and milling on a large, hence the cheapest, scale, and the work now under way will further help, to a certain extent, to prove up the resources of this camp.

#### WATER.

A small creek, or Reed Creek, capable of furnishing enough water for the 10-stamp Strathyre mill, and a second small stream, two miles south, on which is being erected the Tinhorn mill, supply such water as there is on the mountain-side at this point, but the Okanagan River, 2.5 miles distant, carries an ample supply, and can easily be reached by an aerial tramway or small narrow-gauge railway. The Okanagan Falls have been secured by the Okanagan Power Co., whence it is proposed to transmit power for milling purposes. All milling will have to be done at the Okanagan River, as there is not enough water in the small creeks on the hills to permit the continuous run of a good-sized mill, as the water becomes very scarce in fall and winter.

#### TIMBER.

There is a good supply of mining timber on the slopes of the mountains above the mines, that on most of the claims being limited in amount.

#### DESCRIPTION OF MINES.

This claim and the "Black Diamond," area, 41.2 acres, and Crown-Morning Star, granted, are owned by S. Mangott and P. McEachern, Fairview. On the "Morning Star" are two well-defined leads, strike, N. 45° W., dip, 45° to 55° N.E., on one of which, lying at or near the spur of eruptive rock, is a large exposure for about 160 feet of quartz about 30 feet thick, from which 8 to 900 tons were mined and milled, the values in which were not kept separate. The mass of the quartz contains very little sulphides, except at the hanging-wall, but along the foot-wall it is more or less decomposed, of which, where exposed to the atmosphere, the whole becomes reddish-rusty stained. A shaft has been sunk on the hanging-wall side 70 feet, there intersecting the lead, into which a drift has been made for 7 or 8 feet, all in quartz, but water filled these workings at time of visit.

The other vein, 160 feet to the north-east, has been opened up for several hundred feet by shallow inclines, one of which is down on the vein 140 feet, with drifts at the 100-foot level 50 feet each way, showing the vein to be from 2 to 6 feet wide. There is also a small

stope near the surface, and all the ore taken out from these workings sent to the mill is said to have yielded \$15 on the plates per ton. The quartz is crushed and very rusty with iron-stain, as it contains a fair amount of sulphides, and free gold was seen by the writer in samples from this incline and another 30 feet deep, where the vein was 2 or 3 feet wide. For several months in the winters of '92-'93 and '94-'95 the Strathyre stamp-mill, 4,000 feet distant by a good road, down grade, was leased, and the 2,700 tons, yielding \$32,000, as stated, or \$11 per ton, were run through, although much trouble was given by the boiler and engine in the mill. Since then no further work has been done. (See illustration.)

On the "Black Diamond," a claim lying to the south-west, is a nearly vertical quartz vein, running N. 20° E., in which a shaft has been sunk 35 feet, opening up a vein 2 to 4 feet wide of the same character of ore as found on the "Morning Star," but the vein has not been traced for any distance.

**Stemwinder.** This claim, 600 x 1,500 feet, Crown-granted, owned by F. Gwatkin and Geo. Shehan, Fairview, is one of the earliest located, or in 1888. It lies 3,000 feet north-west of the "Morning Star," the "Brown Bear" and "Silver Crown" intervening, and is said to have five quartz veins, three of which were inspected. The veins run N. 50° W., and dip north-easterly 60°, and on one vein that runs through at least six claims, small open cuts and shallow shafts exposed 4 to 12 feet of fine-looking quartz, with the usual sulphides of the camp, mostly near the hanging-wall. Other cuts have been made on some of the other veins, on one a 50-foot shaft, showing a strong vein somewhat honeycombed and much iron-stained where exposed to the weather, so that altogether a large amount of quartz was opened up along the surface of this claim, stated to average \$7 in gold per ton, although no mill tests had been made to corroborate this.

Fine samples of free gold have been found, and much of the loose soil near the veins gave good prospects when panned, but no work is being done this year to further develop the large showings on this claim.

**Strathyre Company.** This company was the first to undertake work of importance in this camp after five properties, the "Rattler," "Ontario Fraction," "Brown Bear," "Wynn M." and "Wide West," had been purchased. These claims are scattered, four of them being on the belt along which are the "Morning Star" and "Stemwinder," while the "Wide West" is a mile easterly from these, but only on two, the "Brown Bear" and "Wide West" has much work been done. On Reed Creek a ten-stamp mill with five Frue Vanners, self-feeders but no rock crusher, and an engine and boiler not at all suited for this work, as it proved inefficient to keep the mill running constantly, was erected on the site of a small five-stamp plant built by the former owners of the "Rattler" claim.

Roads were built to the different properties, and considerable ore was milled from the "Brown Bear" and "Wide West," but mostly from the latter, the results of such crushings being unknown to the writer, but work has been suspended for some years now as the mill is not large enough or properly appointed to treat with profit the large amount of low grade quartz on the claims now to be described. From the "Rattler," "Brown Bear," "Ontario Fraction" and "Wynn M.," it was a down-hill haul to the mill, but some heavy grades had to be climbed in teaming the ore up from the "Wide West," three miles distant.

**Brown Bear.** This claim, the south-east extension of the "Stemwinder," shows two, at least, well-defined ledges running throughout its length, north-west and south-east, and dipping north-east, on one of which, 1 to 14 feet wide, were several cuts and an incline 60 feet deep in which the ledge was about 5 feet wide on top, and 16 to 18 feet at the bottom, of a glassy, white quartz with very little sulphides. A cross-cut tunnel was run 300 feet intersecting this vein at 100 feet, along which drifts were run and some stoping done, while beyond, 2 or 3 other veins were cut, but where they had become very small. Another vein, 100 feet to the south-west, 5 to 18 feet wide, but becoming smaller at the south-east end, where it is probably cut by the tunnel, is exposed by a series of surface cuts, the quartz being similar to that found elsewhere in the camp, with a small percentage of iron pyrites and galena.

The *Wide West* was the claim most worked by the company on a vein running north-east by south-west, and dipping south-east 80° to 85°. Considerable ore was got from a surface cut on top of the bluff, but a tunnel was run in on a vein 2 to 4 feet wide, which suddenly widened, at 150 feet, to 8 to 10 feet, where stopes were run up to the surface, and a shaft was sunk 100 feet, just beyond which the vein suddenly pinches, but a smooth wall with gangue was followed for some distance when the quartz came in again and another stope was run up

with a width of 3 to 6 feet of ore. The quartz is much the same as found on the other claims, but a large amount of white, barren-looking was sorted out, the mineralized portion being sent to the mill, where it is said to have yielded \$11 per ton on the plates.

*Wynn M.*, is the north-west extension of the "Stemwinder," and small shafts are down on the vein, 1 to 5 feet wide, which trends to the west following along the granite spur, or north 70° west.

On the *Rattler* an incline was sunk 100 feet by the former owners on a small vein, but nothing was done by the company.

This claim, 600 by 1,500 feet, Crown-granted, agent T. Davis, Fair-  
**Silver Crown.** view, lies as the S. E. extension of the "Brown Bear," and has been developed by a cross-cut tunnel 250 feet long, where at 80 feet a vein of quartz, more or less mineralized, and 2 to 5 feet wide was intersected and followed by 100 feet of drifts and a winze. Good assays have been got from this rock, but no information as to average values was to be obtained. In the continuation of the tunnel two or three small quartz veins were also cut, but no exploration of any of them made.

*The Evening Star* and *August Fraction*, owned by John F. Stevens and H. Rose, lies as the S. E. extension of the "Morning Star," the vein from which has been traced by small open cuts nearly throughout the whole length of the claims, but no work beyond assessments has been done.

*The Columbia*, 1,500 by 1,500 feet, lying south of the "Rattler" and owned by E. Morris, has a quartz vein 1 to 4 feet wide, strike N. 70° W., dip S. 20° W. 80°, traced by open cuts through the syenitic granite for nearly the whole length of the claim, and a cross-cut tunnel is now in 80 feet, but has not yet reached the ledge.

*Last Chance*, Crown grant, owned by Thos. McAuley, Midway, has a quartz vein 1 to 2, and even 4 feet wide, traced by open cuts for 400 feet. A small shaft, full of water, had been sunk and the vein matter was the white quartz with some sulphides, as copper and iron pyrites, and a little galena banded or much crushed. The formation here, which the vein follows in a N. W. by S. E. course, is a very slaty rock, but no gouge along the walls is apparent.

*Comstock*, owned by Wm. Dalrymple *et al.*, lying about 2,000 feet north-westerly from the Wynn M., and about 600 feet above it, has an exposure for 100 feet of rusty weathering white quartz, honey-combed in parts by the decomposition of sulphides, 15 to 20 feet wide. Two open cuts and shallow shafts had been made while a considerable amount of quartz was piled on the dump, samples from which are said to give good prospects on panning. This vein, but there only a foot wide, crops out in several other places along the mountain-side.

The *Joe Dandy*, *Daisy*, *Atlas*, Crown granted, and the *Belmont*,  
**Joe Dandy.** surveyed for Crown grant, are owned by the Fairview Gold Mining Company, Ltd., London, England; general manager, J. R. Mitchell; superintendent, E. F. Ballard. These claims lie at the foot of the mountains, and the vein, strike N. 65° W., dip, northerly, 36° to 60°, crosses two small ridges, on the summit of one, where the vein lay between a dyke of porphyritic rock and quartzose schists, where considerable ore was raised by the original owners and milled at a small stamp mill in Reed Creek, below the hotel in Fairview, yielding, it is reported, excellent returns. The vein, so far developed, is not large, or from 1 to 3 feet wide, but the quartz is bluish-white in colour with sulphides, and gives good gold assays wherever thus mineralized. At the foot of one level on the Joe Dandy tunnel, No. 2 had been run westerly for nearly all the distance along the vein, with an upraise on a cross-cut vein, running west and north-east, of 40 feet to a small cross-cut tunnel.

On an upper bench, 600 feet west of No. 2, a cross-cut tunnel, No. 1, was in 225 feet, while on the vein itself a short tunnel had been driven, opening up 3 to 4 feet of ore, and the west shaft was down 60 feet on the vein, which varies much in width. A steam hoist will soon be installed at this point, and in the meantime all ore extracted is being kept separate from waste rock.

Surveys had been made for an aerial tramway, about 10,000 feet long, down to a mill-site on the Okanagan River, where it is proposed to erect a 20-stamp mill at a point four miles below the falls, where a plant for the generation of electric power is projected, such power to be used at the mine and mill.

The *Tinhorn*, *Big Horn*, and *Fortune* had been acquired by the company of which W. A. Dier was manager, and W. S. N. Wills, M. E., was superintendent. These claims lie in the quartzite south of the granite spur  $1\frac{1}{2}$  miles by waggon road from Fairview. On the "Tinhorn" a ledge, bluish quartz, 2 to 5 feet wide in places was being opened up along an east and west strike

and a southerly dip, while a large exposure of white-weathering quartz similar to that found on other claims already described was not yet being tested.

The locators of the claim put their discovery post on this out cropping of white quartz, and ran in a cross-cut tunnel under it without again finding it. A tunnel 180 feet long was being pushed ahead, but had passed into the quartzites, while near the entrance, nearly 9 feet of the bluish quartz, carrying some sulphides as iron pyrites and a little galena, and, it is claimed, some tellurides, were followed for some distance until cut off by a fault, near which a winze was being sunk 26 feet deep, May 30th, with 3 to 5 feet of quartz all the way down.

Farther on in the tunnel a connection is made with a shaft sunk 64 feet, 45 feet of which was on the ledge until a fault, probably the same but of small dislocation, as met with in the tunnel.

Several hundred feet higher up, tunnel No. 2 was just being started where the ledge was 4 to 5 feet wide of banded quartz entirely conformable with the enclosing schistose quartzite, carrying sulphides as iron pyrites and galena, and copper stained, and as the ledge runs into the mountain, mining through tunnels will be followed. All material from the ledge is being stored on separate dumps.

On the "Fortune" two tunnels were being driven westerly along the quartzite formation.

*Mill and Mill-site*—Immediately below a mill-site had been located on Tinhorn Creek, whither a three-rail tramway, 540 feet long, runs from the main tunnel to the mill now constructed by the Joshua Hendy Company, San Francisco, in which are 8 2-stamp triple discharge stamps, self-feeders, crusher, vanners, and 100 h. p. Corliss engine, 120 h. p. boiler and an electric lighting plant of 450 16-candle power capacity. Sufficient water for such a size of plant was claimed to run all the year in this small creek.

It was also claimed by the management that high assays were obtained from the rock now being mined, especially that rock carrying the most sulphides, but since the completion of the mill, several hundred tons have been run through, with results that were very disappointing. The supply of water is now found to be inadequate, and as the mill is not frost-proof, milling has been stopped. However, later on other mill-runs may prove up better grade rock.

The *Smuggler* (Crown grant), *Revenue*, *Vancouver*, *Mountain Side*, *Smuggler*, *Skylark*, and a mill-site on Reed Creek, lying between Fairview and the

"Tinhorn" claims, are owned by the Smuggler G. M. & M. Co.; president,

H. H. Dewart, Toronto; manager, G. H. Maurier, Fairview.

On the "Smuggler" a shaft was down 110 feet along the ledge which runs nearly east and west with the stratification. A horse-whim was being used for hoisting, but a small steam hoister was being put in, and on the dump was accumulated from the shaft considerable quartz of a bluish-white colour, with some sulphides, which was being conveyed over the waggon road built to the Strathyre mill for a mill-run. About 175 feet below the top of the shaft a tunnel was driven in for about 100 feet, in which was seen a small amount of quartz irregularly scattered along this working and dipping south with the formation. This tunnel and shaft will be continued until connected.

The Strathyre mill has been leased, and Mr. R. Dewar will, after getting the mill in working order, make a series of mill-tests to ascertain the value of and best method for treating the output of these properties, and if developments so warrant it a mill will be erected on Reed Creek on the mill-site easily reached by tramway from the mine. No other prospecting work was seen. Since time of visit about 400 tons have been milled that are reported to have yielded about \$8.00 per ton by amalgamation.

#### THE FAIRVIEW CONSOLIDATED GOLD MINES COMPANY.

This company, with a capitalization of \$2,500,000, Mr. W. S. N. Wills, superintendent, has secured a number of mineral claims located in different parts of the camp, on which, as yet, but little development other than enough to secure Crown grants has been done, but further work was being prosecuted on some of these locations, which comprise the "Fannie Morris," "Silver Bow," "Nightingale," "Reco," "Standard," "Ocean," "Sundown," "Rob Roy," "Iron Clad," "Quartz Queen," "California" and "White Swan," and of which the first four were visited.

The *Silver Bow*, lying northerly from the Brown Bear, has a vein running north-east and south-west across the formation, on which a tunnel, after cross-cutting for about 75 feet, runs for 75 to 80 feet along a vein 2 to 3 feet wide and 6 feet wide in one place, of a very white quartz carrying a very small percentage of sulphides. Gold values not known.

*Fanny Morris*, about one mile south of Fairview, below the road to the "Tinhorn," has a shaft sunk 18 feet, showing considerable decomposed quartz matter with some sulphides, towards which two men were at work running a cross-cut tunnel.

*Nightingale*, located N.E. of "Tinhorn," at foot of mountain, where a vein running N., 20° W., of white quartz with iron and copper pyrites and galena, is disclosed for several hundred feet by open cuts and a shaft about 20 feet deep.

*Reco* has an exposure in one place in the granite of rusty weathering quartz, 2 to 3 feet thick, carrying very little sulphides. It dips N.E. at an angle of 30°, and a shaft has been sunk 30 feet to strike it, but is not yet deep enough. Work sufficient to secure a Crown grant has been, or is being done on other claims. From the different claims, samples according to the prospectus of the company have given high assay values, but no estimate can yet be found as to the amount and value of the quartz that may be developed on these claims, as only mill-runs can afford decisive and reliable information.

This claim, owned by the Winchester G. M. and M. Co., Mr. Wills, **Winchester.** superintendent, lies in the granite, easterly from the "Wide West," and has exposed in one place, only for about 150 feet, a vein of white quartz 1½ to 2 feet wide, strike N. 10° E., dip S. 80° E. 60°-75°. A shaft had been sunk 25 feet on the vein, but 40 feet easterly a shaft was being sunk through a greenish-coloured granite, but at 35 feet had not yet reached the vein.

The "Comet" and "Western Girl," Crown-granted, owned by Jno. C. **Comet.** Stevens, lie along the westerly side-line of the "Stemwinder" and "Wynn M.," and on the "Western Girl" a quartz vein 4 to 5 feet wide, strike N. 70° W., showed free gold and some iron and copper pyrites and galena, and two shafts, 75 feet apart, had been sunk 25 to 30 feet. On the "Comet" a vein running N. 45° W. was uncovered by some open cuts about 75 feet west of the vein on the other claim, a vein 3 to 5 feet wide with ore of a similar character to that found in the adjacent properties.

#### OTHER CLAIMS.

Many other claims have been staked off, on many of which more or less quartz is showing, but nearly all the leading properties have been described above. The work now in progress will help, to a great extent, to give more knowledge concerning the values contained in the large amount of quartz, large assays are easy to obtain where the sample is picked, but that all-important information, the average milling value, must be obtained from the results of careful mill-runs on a large tonnage of ore.

#### CAMP MCKINNEY.

Camp McKinney has been founded and brought into prominence by the continued success of the "Cariboo-Amelia" mine, which since the erection of its stamp mill in 1894 has been worked continuously, paying its owners dividends to date of \$188,965, with the promise of much more while the stamps keep up their unceasing rumble. As in Fairview, a large amount of gold-bearing quartz is now in view, but while much information from assays and panning-tests seemingly point to the fact that the veins so far exposed by comparatively superficial prospecting, carry ore of a very low grade, it yet remains to be proven by more extensive underground workings and mill tests whether these quartz ledges now lying untouched cannot be made profitable if developed and milled in a proper manner, or whether other pay shutes may not be found.

The history of the camp begins in 1884, when the "Victoria" vein on Rock Creek was discovered a short distance above the placer diggings of early days, but little was done until 1887, when the "Cariboo" vein was found standing boldly out of the ground with free gold showing (*see illustration*), but even then progress languished until the present company began work in earnest.

#### LOCATION.

Situated at an elevation of 4,600 feet above the sea level, or 3,500 feet above Okanagan Lake, on round-topped hills gradually climbing up to the granite core, Bald Mountain on the east slope of the water-shed between Okanagan and Kettle Rivers. The camp is on the main stage road 56 miles easterly from Penticton and 32 miles westerly from Midway, or 44 miles from Greenwood City. It lies between Rock Creek and the South Fork, and the small mountain stream, Rice Creek, passes through the camp.



## GEOLOGY.

Granites and gneisses are developed on a large scale, and also diabasic rocks enclosing very highly altered stratified rocks such as gneisses, quartzites and crystalline limestone, and in all of these rocks veins have been located, although immediately at Camp McKinney the veins are in gneisses and quartzites and probably diabasic rock, the bands of quartzite weathering red and white, and assaying from traces to \$4 and \$5 in gold. Some of the rock, such as that in which the "Cariboo" vein is being mined, while showing signs of foliation on the surface, is practically massive and greenish in colour, but not quartzose, except as traversed by small quartz stringers.

## VEINS.

In this camp the veins in the stratified rock do not conform with the dip and strike of those walls as at Fairview, but cut across the stratification with an east and west trend and a southerly dip of 75° to 90°. Along a series of flat-dipping fault planes of 10° to 30° east, the veins have been thrown, below the faults, to the south for distances of 5 to 60 feet, and there are evidences of one throw of nearly 140 feet. There are minor slips in other directions, but the direction of throw is nearly always indicated by the bending of the vein or by a "tail" of quartz towards the other part of the deposit in the gouge along the smooth fault wall. The main vein, as thus developed, running through the "Cariboo-Amelia" claims, and also the "Alice," "Emma," "Maple Leaf," "Eureka," "Mammoth," and other claims, is from 1 to 10 feet wide, with an average width of about 4 feet in the "Cariboo-Amelia."

The first locators, believing this vein ran with the formation, located their claims accordingly, when, on further prospecting, they found that such claims as the "Cariboo," "Amelia," "Alice," "Emma," "Kamloops," and "Okanagan" were staked out across the vein and not along it, or with 600 feet each of the vein instead of 1,500 feet.

Other but smaller quartz veins have been discovered on the "Minnie-ha-ha," "Sailor," "Fontenoy," "Victoria," "Old England," etc., some of which are similar in character to the "Cariboo" lead but with a decided difference in the last two named. On the "Anarchist," located one mile west of the "Cariboo," and on the strike of that vein, a strong quartz vein cuts through the granite not far beyond the line of junction of the granite and the bedded rocks. On the "Le Roi" and "War Eagle" claims, 3½ miles from the camp, in diabasic rocks, has been found a large deposit of iron pyrites and pyrrhotite carrying some gold.

While at Camp McKinney the main or "Cariboo" vein runs east and west, the other quartz veins have quite different trends, as the vein N. 45° E. on the "Sailor," N. 45° W. on the "Fontenoy," N. 70° W. on the "Dolphin," and N. 10° E. on the "Victoria."

## ORE.

Most of the quartz is milky-white and compact, weathering white on the out-crops, but rusty red on the dumps from the oxidation of the small amount of sulphides present, or well crystallized iron pyrites with some blende and galena and, in places, chalcopyrite.

Much of the quartz is white and barren looking, the sulphides being mostly near the foot-wall, although sparingly scattered through the whole mass. The quartz of the "Cariboo-Amelia" ore-shute is of a bluish white, with 3 to 3½ % of sulphides, the gold values being in direct proportion to the amount of these sulphides and the size of the vein, the ore becoming very low grade in the narrow parts.

## VALUE OF ORE.

Free gold was found in the early work, but from a depth of 160 feet in the "Cariboo-Amelia" mine, two fine samples of gold in bluish quartz were presented to the writer by Mr. Keen. In this mine the gold values are claimed to have decidedly increased with depth, the ore in the upper level having averaged \$11, saved by amalgamation on the plates, while now that from the 175-foot level stopes is yielding \$15 to \$16 on the plates per ton of rock crushed. In depth the amount of sulphides has somewhat increased, until now about 3½ %, the concentrates from which yield from 3½ to 4½ ounces in gold, and 2½ ounces of silver per ton, or \$2.50 to \$3 per ton of ore, or a total *yield value* of about \$17 to \$18 per ton for the ore from the lowest workings on the vein, all of which is mined and milled.

On the other claims on this vein on which practically, with the exception of the "Eureka," very little work has been done, ore-shutes like the "Cariboo" have not yet been found, although some very rich rock has been taken out. The mass of the quartz, however, has so

far proved to be low-grade, running from \$2 and \$3 to \$10 in gold per ton, much of it assaying only up to \$1 or \$2 per ton, but it is difficult to presage what more extended development would disclose in other than the shallow prospect holes now put down. The "Victoria" ore consisting of quartz, iron pyrites and zinc blende, has constantly given high gold values on assay.

#### TREATMENT.

All the quartz ores of this camp will be essentially free-milling when the sulphides will be easily saved by concentration, and sold to the smelters.

#### WATER AND TIMBER.

Sufficient water for 30 stamps is estimated to flow in Rice Creek, which could be re-used by mills located below each other on this creek, or water could be brought without much expense from the branches of Rock Creek. There is an abundant supply of good timber.

#### COSTS.

The price of labour is the same as in the other camps of the West, but the freighting charges of \$30 to \$35 per ton from Pentiction increases the cost of supplies. Freight on concentrates to Pentiction \$10, thence to smelters \$5.50, a total of \$15.50 per ton. Fire-wood delivered at mine \$1.75 per cord.

These two claims, Crown grants, owned by the Cariboo Gold M. & M. Co. Capital stock \$800,000. President, Jas. Monaghan; Secretary, Geo. Amelia. B. McAuley, Spokane; Superintendent, J. P. Keen; are located along about 1,100 feet of the vein, which runs east and west, nearly vertical or with a small southerly dip. This vein has now been opened up for 600 feet along a continuous but faulted ore-body from 1 to 8 feet wide, average width about 3.5 feet, and to a depth of 175 feet.

On the surface is well seen the dislocation of about 60 feet by the main fault dipping east 30°, the vein there standing several feet above the surface and 4 to 5 feet wide. Three shafts have been sunk, of which the present working shaft is 175 feet deep, while in the gulch down which runs Red Creek, is a cross-cut tunnel 250 feet long, which taps the vein west, then runs on to that part east of the main fault, whence it extends as a drift for nearly 600 feet, 65 to 71 feet from the surface. All the ground is stoped above this level, and also a good deal of the ground below down the main fault. From near the bottom of the 175-foot shaft, drifts extend for some distance along the vein, here 2 to 6 feet wide, and the ground is being stoped out at a rate to keep the ten stamps at work, or 15 to 18 tons per day. This main fault extends down through the workings to the mine, cutting the vein clean off, where it has a width of 2 to 6 feet of the best ore yet mined, and the continuance of the ore-body below the fault to the south is thus assured. The company has as yet done but little dead work, but on the arrival of the boiler for the compressor, the shaft will be sunk another hundred feet, and a cross-cut run to tap this ore below the fault, when another full-sized working shaft will be raised to the surface at a point in close proximity to the site of the proposed new mill.

*Plant.* At the present main shaft are a single-acting hoisting machine, boiler, and a four-drill Rand air compressor, for which a new boiler is *en route*, after the installation of which a sufficient shaft-house will be built, but a better plant and building is projected when the new shaft is completed. A small steam pump lifts the water to the tunnel level.

*Mill.* On Rice Creek is the stamp mill, with (a) Blake crusher; (b) two batteries of 5 stamps each (Risdon Iron Works, San Francisco); stamps 850 lbs. each, dropping 6 inches 85 times per minute; height of discharge, 6 inches; screens, 30-mesh Russia iron; inside copper plate at bottom of screen, 6 x 54 inches; outer coppers, 54 x 120 inches, in 5 plates with 1-inch drop each; (c) four double Gilpin County bumping tables; (d) tank for heating battery feed-water; (e) a 25-h.p. engine (*see illustration*).

The value of ore and concentrates has been stated above, the concentrates containing 35 % iron, 9 % SiO<sub>2</sub>, and less than 10 % zinc. Cost of smelting, \$3.50 per ton, or a total of \$19 per ton for freight and treatment.

*Grade of Bullion.* Gold, 635 fine; silver, 340. Cost of mining per ton, \$4; of milling per ton, \$2.

Over 21,000 tons of ore had to date (June) been mined and milled, or from 500 to 550 tons per month, and dividends to the amount of \$188,965 have been declared, \$32,000 of which were for 1897.

The tailings are said to run from \$1.50 to \$2.50 in gold, but in the new mill much closer concentration of the auriferous sulphides will be in all probability effected by the vanners.

**Alice and Emma.** These claims, Crown grants, Jas. B. McAuley, Spokane, lie immediately west of the "Cariboo," and on one of which is a 63-foot shaft (flooded) down on the vein 7 to 1½ feet wide, of which quartz with a little iron and copper pyrites and blende, which ore is stated to have given fair assay values in gold. The course of the vein is shown by two other openings, but the ground here lies flat and is covered with small timber. No work has been done for several years, or since 1888.

**Maple Leaf.** Title, Crown grant, Geo. B. McAuley, Spokane. The main vein continues through this property, located 1,056 feet along its course, and lying between the "Emma" and "Eureka." A shaft was sunk 45 feet (flooded) in a bluish-white quartz 4 to 6 feet wide, carrying some iron pyrites.

**Eureka.** Title, Crown grant, 19.9 acres, Jas. Douglas, Midway. Lying west of the "Maple Leaf," the vein shows up strongly on this claim, and also on the face of the bluff on the "Mammoth" claim next west, and a shaft was started on a vein of white quartz 6 to 7 feet wide, here traversing gneissic and quartzite rocks, but the pitch of the vein flattened a little on the first stope. At 85 feet, a drift was run 125 feet along and in the vein 4 to 6 feet wide. A little lower, one of the flat-dipping faults was struck that threw the ledge a few feet to the south, where, at the bottom of the shaft, it was cross-cut and drifted on for 15 feet, showing 1.5 to 9 feet of white quartz, little mineralized. About 100 feet east, a shaft 15 feet deep was sunk on the same vein, and some very high grade ore was found. A large body of quartz is on this property, some of which has assayed very high in gold, while much has given low returns, but no mill test that would give any idea of the average values has been made. Not worked for several years.

**Dolphin.** For this claim and the "Shannon," Crown grants are to be applied for by C. A. R. Lambly, Osoyoos, and W. Edwards, Camp McKinney. Lying further west of the "Eureka," three veins are claimed to be on the "Dolphin": (a) a quartz vein showing at one place in a shaft 1½ to 3 feet wide, strike N. 60° E.; (b) farther west appears to be a band of mineralized quartzose rock, said to give good assays in gold, towards which a tunnel has been run 60 feet through the very quartzose schists; (c) near the westerly line of the claim is a vein of quartz with a small amount of pyrites, 3 to 5 feet wide, running N. 70° W., and traceable where it stands up above the surface for about 1,000 feet. No mill tests.

**Minnie-ha-ha.** This claim, 1,500 x 1,500, Crown grant, the "Cariboo Fraction," and the "Golden Crown Fraction," owned by the Minnie-ha-ha Gold Mining Co., Toronto, president, Prof. H. Montgomery, secretary, H. Kitley, Toronto, capital stock, \$1,000,000, lie south of the "Cariboo" and "Saw-Tooth" claims, and on the "Minnie-ha-ha" claim a small quartz vein, running parallel with, but nearly 1,500 feet south of the "Cariboo" vein, has been traced for 50 feet on the surface, with a width of 6 inches to 2 feet, the deep wash and timber having so far hidden any further trace of its continuation. A few paces from the west side line a vertical shaft is being sunk on the exposure of the vein, and (June 4th) was 55 feet deep, in which the vein was from a few inches to 4½ feet wide, of a bluish quartz, carrying a little iron pyrites and galena. Faulting, as in the other properties, was being encountered. Good log cabins, bunk houses, eating-house, assay office, etc., had been built, a roadway cut out to the stage road. This company also owns some neighbouring locations, the "Hiawatha," "Medan," and "Kuka." Thirteen men were at work under the superintendence of A. McGraw.

**Kamloops.** Crown grant, 600 x 1,234 feet; owned by Jas. Moran; lies west of the "Minnie-ha-ha" shaft. A small shaft full of water. Some quartz lying on the dump was seen.

**Sailor.** To be surveyed for Crown grant; owned by Chas Dietz, Camp McKinney; lies west of "Kamloops" and south of the "Emma" and "Maple Leaf." Some stripping and a small shaft exposed a vein, strike, N. 45° E., 2 to 3 feet wide, carrying in places much sulphides.

**Big Bug,** 1,500 x 1,500, lying about 1,500 feet south of the "Minnie-ha-ha," owned by A. McGraw and W. H. Norris, Midway, has a small vein running east and west, but no work done.

**Saw-Tooth,** a fractional claim, owned by A. O'Connors *et al.*, lies south of the "Amelia," and covers the space between that claim and the "Okanagan, has on this spur, in a shaft, an

exposure, showing, also on the "Amelia," 3 to 5 feet wide of quartz and sulphides, very similar to the "Cariboo" ore, but lying about 150 feet south of where the "Cariboo" vein is thought to pass.

*Okanagan*, title Crown grant, 600 x 1,452 feet, owned by S. Mangott *et al.*, lying east of the "Amelia," has a shaft down on a body of quartz, but no work has been done for some years.

*Warton*, surveyed for Crown grant, owned, also some other locations, by a stock company, has had considerable work done, as it lies just east of the "Okanagan," in prospecting for the extension of the "Cariboo" vein, but so far, it is understood, without success, as no quartz was seen at the workings visited.

To be surveyed for Crown grants; owned by Hugh Cameron *et al.*,  
**Fontenoy,** Camp McKinney, whence the claim lies one-half mile north east. On the  
**Vernon.** "Fontenoy" a vein running N. 45° W., and dipping N. 45° E. 45° to 55°,

in which is white quartz, fragments of country rock, and sulphides, *i. e.*, iron pyrites, galena, and blende, has in one place a shaft or incline 53 feet deep (flooded), from which had been taken a large pile of highly mineralized quartz, much of it massive iron pyrites and galena, said to give good values in gold. In the bottom of the shaft the vein is said to be 5 feet wide. About 600 feet S. E., along the strike, the vein, 2 feet wide, again appears, where the quartz is much honeycombed, carrying coarse-cubed galena, and a shaft was sunk but not far enough to reach the vein. On the "Vernon" a shaft was down 30 feet in a slaty formation, where this same lead was supposed to pass.

Title, Crown grant, 600 x 1,500, and the locations, "Queen and "Cal-  
**Victoria.** ifornia," 1,500 x 1,500 feet, 3½ miles by road from Camp McKinney;  
 owned by the Rock Creek M. and M. Co., Victoria; managing director,  
 Theo. Lubbe, Victoria; superintendent, C. B. Bash, Camp McKinney.

Rock creek has cut, below a fine waterfall, a narrow gorge, 300 feet deep, and along one bank runs a strongly marked fault plane nearly north and south, with a dip of 60°, above which, for most of the distance, is a heavy bed of bluish quartzite, and below a light green, fine-grained rock, resembling diabasic material, although rather slaty in parts. From the bottom of the gorge, or near the creek level, tunnel No. 2 cross-cuts this greenish rock 205 feet to the fault-wall, down under which, in soft crushed rock-matter, an incline was being sunk (63 feet, June 7th), while an upraise of 145 feet reached a short tunnel 25 feet long, run in the earlier workings to the break. Along under this smooth wall and in this soft material is found a bluish quartz, with iron pyrites and blende, also a little galena, which assays high in gold, the ore being found as if a vein from 2 to 20 inches wide had followed along near the present course of the break, but had since been broken. All this ore is sorted out and sacked or stored, several tons being thus piled up. This tunnel, about 25 feet back from this wall, cut across two small veins of the same character of ore, from 1 to 14 inches wide, dipping towards the wall on a pitch of 45°, and another such was cut 8 feet from the wall.

Tunnel No. 1, 750 feet from and 50 feet above No. 2, runs in 198 feet to the wall, along which 190 feet of drifting has been done, a vein a few inches wide of quartz continuing most of the way. The tunnel continues 36 feet beyond the break through the broken country rock, consisting chiefly of quartzite.

Two other veins are supposed to run through this property, and tunnel No. 1 may be pushed ahead to prospect. All the underground workings are timbered up in good style, and on the flat above are excellent log cabins, bunk-houses, etc., there being a plentiful supply of good timber on these claims. Since visit, a trial shipment of over 25 tons of this sorted ore to a smelter ran 2.15 ounces gold and 5.2 ounces silver, net, per ton.

This claim, 600 x 1,500, lies next to the "Victoria," and, with the  
**Old England.** "Homestake," is owned by Nicholson and James. On the "Old England" a large incline shaft has been sunk 70 feet under the fault-wall and a few feet from the end-line, and further along in the claim a cross-cut tunnel was driven without showing up anything. On the other side of the creek a small quartz vein, strike north and south, is being opened up by a tunnel 20 feet, and good assays of gold are got in samples of this ore.

The *Le Roi* and *War Eagle*, 5 miles S. E. of Camp McKinney, and on the old Kettle River trail, were located in 1896 by Jas. Copland and William Yonkin, who have exposed a large body of iron pyrites, pyrrhotite and quartz, with a little chalcopryite in diabase. A shaft has been sunk 50 feet, with a drift of 20 feet to the east all in these sulphides, the trend and extent of which body are not yet known. This mass of sulphides, of which a considerable dump has accumulated, is said to give fair values in gold, or from traces to \$26 by assay.

### BURNT GROUND.

This district, to the north-west of Camp McKinney, comprises quartzite with areas of diabase, and probably diorite, in which small irregular veins of white quartz are being located, but the "Bunker Hill" and "Cameronian" could not be found on the day of visit.

The "Anarchist," Crown-granted, 51.65 acres, and the "Dynamite," **Anarchist.** owned by R. G. Sidley, Sidley P. O., lie about one mile west of the "Cariboo" mine, and close by the main road. Here, in the granite, is a vein, traceable for at least 600 feet, of a very white quartz carrying a very small amount of sulphides as pyrites, zinc blende and galena, with some gold values, but what average values had not been determined. A shaft had been sunk 60 feet, in which were encountered two nearly horizontal faults, along which the vein had been moved the width of itself. Near by are two parallel veins 2 to 4 feet wide traceable for some distance, but not explored. All of these veins run N. 20° E., with a vertical dip.

For water a ditch was being run from the south fork of Rock Creek to bring in 300 inches, which would be available with a head of 250 feet, thus supplying water and power for milling purposes should further work prove this ore of high enough grade to warrant the erection of a stamp mill. There is little or no timber on these claims.

### VERNON DIVISION.

The town of *Vernon* is situated in the broad valley in which most of the Yale grain, fruit, and cattle and horse ranches are, but during the past two years much prospecting has been done on the surrounding low-lying hills, that consist of altered sedimentaries, as limestones, quartzites and slates, contorted and compressed by eruptive rocks, such as porphyrites, diorites (?), etc.

Work has been confined mostly to veins of quartz, generally milky-white in colour and very free from sulphides, and while some very nice samples have been found, as yet no shutes of pay-ore can be reported. All of this country is very easy of access, as a saddle-horse may be ridden almost anywhere. The town is beautifully situated on a branch of the C. P. R. from Sycamous, on the main line to Okanagan Lake, on which runs the steamer "Aberdeen" to Penticton, whence run the stage roads to Fairview, Camp McKinney, Greenwood, etc.

### MINING PROPERTIES.

The *Morning Glory Mining Co.*, capital stock \$500,000; president, E. A. Morden, Vernon, owns the "Sarah," "Morning Glory," "Jumbo," and other claims west of Okanagan Lake, and on the "Sarah," a fractional claim, a small vein of milky-white quartz, with a good amount of sulphides, was being stripped. Some fine samples of free gold are said to have been found on the out-crop, and a tunnel was then in 30 feet along this vein.

On the "Morning Glory" a shaft had been sunk 80 feet on a vein traceable for some distance N. 50° W., of glassy-looking white quartz with very little sulphides, in a greenish granitic rock. No free gold is visible in this large body of quartz at the shaft. It is understood that a 5-stamp mill has since been erected near the lake side, and that this ore has been milled, but not with favourable results. No work is being done at present.

*Ruby Gold Mining Co.*, capital stock \$400,000; secretary, Jno. Bond, Vernon. This company has about 14 claims north of the "Morning Glory" and six miles from Vernon, but little or nothing has been done on them during the past season. They lie on the ridge about 600 feet above the lake. "Golden Sunbeam," lying south of the "Sarah," has several very small veins of milky-white quartz in a schistose formation, very free of sulphides, and not traceable for any distance. It is said gold colours can be panned out of the decomposed surface dirt.

*Ruby Gold.*—A shaft has been sunk 30 feet, starting on a vein of milky-white quartz 10 to 12 feet wide, with some iron pyrites, which towards the bottom breaks up into stringers in the gneissic country rock. It is said free gold has been found in this vein which can be traced for several hundred feet with a very irregular width, and where it crosses the *Globe-Call*, it has a wide exposure 12 to 14 feet wide of barren-looking quartz, which can be followed down to the lake side.

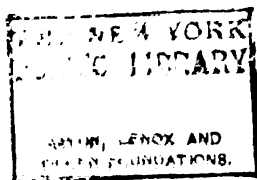




STRATHYRE MILL, FAIRVIEW, B. C.



CHINESE PLACER MINING, ROCK CREEK, YALE.



*Cartwright.*—Southerly from the "Ruby Gold," is another vein, several feet wide for some distance, of white, barren-looking quartz. No work done.

*Three Tramps.*—Here H. Sidel *et al*, in a dioritic formation, were sinking a shaft to explore some copper-stained, decomposed material, which at time of visit was proving to be a mixed mass of pyrrhotite with a little iron and copper sulphides, of which no assays had been made.

*Iron Cap.*—Near the lake work was being done by N. P. Nelson *et al*, in a 10-foot hole, where were two narrow veins of sugary white quartz, with a little copper pyrites, but not traceable far.

*Bon Diable.*—These claims lie on the hills 3.5 miles S. W. of Vernon, and a 35-foot shaft had been started on a 3-foot quartz vein, which narrows quickly in depth, and is cut off by a fault, and a 75-foot drift had not picked up the vein again. Good silver assays are said to have been got from this vein. Higher up this hill a tunnel was being run in an irregular mass of crushed quartz, and on the surface are very large boulders of quartzose rock, probably of quartzite, of which a strong bed lies further up the hill-side.

*Swan Lake Group.*—These six claims lie east of Swan Lake 3.5 miles from Vernon, and are located on a belt of highly altered but still stratified quartzites, that extends through the country at this point. A small shaft has been sunk, and shallow cut run in, close by the waggon road. In this rock there are no signs of mineralization whatever.

*Blue Jay.*—This claim, bonded to Mr. A. H. Craven, lies on the top of a hill about 1.5 miles N. W. of Vernon, and on a vein of sugary, yellow white quartz, carrying iron pyrites and mispickel, 3 to 4 feet wide but not traceable for any distance, a shaft was down 25 feet, showing a continuous vein with soft, yellowish gouge along the hanging wall. Good gold values are found in this gangue on the vein, quartz itself is said to give fair assay values. As water was beginning to come in, a cross-cut tunnel of about 120 feet is being driven to tap this ledge. A large exposure of barren-looking quartz in this claim has not been tested.

*Chance*, and two other claims, owned by T. S. Wolcott, D. G. Skea *et al*, are located on the mountains, about nine miles S. E. from Vernon. The road, passing the Aberdeen Ranch, leads to the foot of the trail  $\frac{3}{4}$  of a mile long that rises 800 feet to where, on the side of the steep hill overlooking a branch of Coldstream Creek, is a large exposure of reddish-white quartz, 6 to 10 feet thick, in a granitic, but decomposed rock. A 25-foot shaft had been sunk on this vein, which can be traced for some distance, but small values in gold, or less than \$1 had ever been got. A cross-cut tunnel is now being run to tap this vein at a lower depth, where it will be further explored to see if an ore-shute can be found. There is plenty of water in this creek, 600 feet below.

*Camp Hewitt Mining Co.*, capital stock \$1,000,000; Secretary, G. A. Hankey, Vernon. This property of ten claims lying west of the southern end of Okanagan Lake was not visited, as nearly all work had been stopped, and very little was done during the year. Some prospecting has been done on these claims, but very little development work, and only a small amount of ore has so far been uncovered. Of this ore, or quartz with chalcopyrite, two small shipments were made to the smelter at Tacoma, that returned:—

Lot 1.—Gold .1 oz.; silver 13.9 ozs. per ton; copper 11.7 %.

" 2.— " .15 " " 13.8 " " 10.5 %.

More capital is required to carefully explore this ground, as the work so far has not been such as to demonstrate very much, as to the probable ore-bodies or ore-values.

*Monashee.*—This property on which considerable work has been done to open up a quartz vein, lies about 60 miles by road south-easterly from Vernon, and during the past season was bonded to Captain Molyneux. Nothing is known to the writer as to whether anything has been or is being done on these claims since the taking up of this bond.



## SIMILKAMEEN DIVISION.

BY HUGH HUNTER, MINING RECORDER.

"I have the honour to forward the annual mining statistics for the Similkameen Division, from which you notice that Granite Creek still leads in the output of gold.

"There are some forty leases of mining ground held in this division, and out of that number only four leases have been worked this season, those being held by the Granite Creek Mining Company, situated on Granite Creek. Work was carried on through the whole season with a force of twenty-five men, and only shut down when compelled by frost.

"The Slate Creek Development Company sank a shaft some ninety feet, prospecting for the old channel of Slate Creek, and worked the greater part of the season.

"Considerable prospecting has been done this year for quartz, and over one hundred claims have been recorded.

"On Copper Mountain, which is situated between Wolf Creek and the South Fork of the Similkameen River, much prospecting has been done, and a number of claims located.

"The 'Sunset,' being the best known, is owned by Robert Allen Brown, of Grand Forks, B. C., and the ore assays on an average about sixty (?) per cent. copper, and also carries gold and silver.

"Mr. Brown informs me that he has disposed of a half interest to a Rossland syndicate, and also that a number of claims in the same vicinity have been bonded.

"Free gold has been found on Roche River, which forms one of the forks of the South Fork of the Similkameen River, about thirty miles south of Princeton.

"A number of mineral claims have been located on the Tulameen River. The ore found is principally gold and copper, although at the headwaters large bodies of silver ore have been reported. But as little work has yet been done I am unable to report fully as to its value.

"A trail has been built into this section from Hope, a distance of about thirty miles; and also the trail from Granite Creek has been much improved."

## RETURNS FROM MINING RECORDERS.

Mr. C. A. R. Lambly, gold commissioner, has submitted a long and full report, but as the report of the Provincial Mineralogist covers nearly all of this ground, it has not been published, except the following returns from the mining recorders, which show markedly the great increase in the number of locations, transfers, etc., during the past year:—

## OSOYOOS DIVISION. JAS. R. BROWN.

	1896.	1897.
Free Miner's Certificates .....	167	350
Location Records .....	303	692
Conveyances and Agreements .....	112	228
Certificates of Work .....	111	290
" of Improvement .....	1	24
Permission to Re-locate .....	3	12
Mining Receipts .....	\$1,572 55	\$4,425 67
Free Miner's Certificates .....	845 00	2,112 00
Total .....	\$2,356 55	\$6,537 67

## KETTLE RIVER DIVISION. MR. WM. G. McMYNN.

	1893.	1894.	1895.	1896.	1897.
Free Miner's Certificates.....	194	202	457	957	1,050
Location Records.....	102	93	771	1,297	1,056
Certificates of Work.....	66	85	140	566	749
Conveyances.....	59	55	244	713	749
Certificates of Improvement.....	0	3	11	15	16
Mill-site Leases.....	0	0	3	1	4
Abandonments.....	6	0	12	35	59
Water Grants.....	1	3	3	3	1
Permits.....	0	0	3	9	1
Revenue—					
Mining Receipts.....	\$ 801 55	\$ 947 35	\$3,153 25	\$ 7,240 45	\$ 7,376 90
Free Miner's Certificates.....	870 00	1,065 00	2,256 00	4,778 00	6,974 00
Total.....	\$1,771 55	\$2,012 35	\$5,409 25	\$12,018 45	\$14,350 90

## GRAND FORKS DIVISION. MR. S. R. ALMOND.

	1897.
Location Records.....	430
Certificates of Work.....	366
Transfers, Agreements, etc.....	307
Abandonments.....	22
General Records.....	3
Certificates of Improvement.....	2
Free Miner's Certificates.....	149
Revenue collected—	
Mining Receipts.....	\$3,081 40
Free Miner's Certificates.....	831 00
Total.....	\$3,912 40

## VERNON DIVISION. MR. J. C. TUNSTALL.

Location Records.....	395
Certificates of Improvement.....	1
" of Work.....	105
Transfers.....	106
Free Miner's Certificates.....	382

## SIMILKAMEEN DIVISION. MR. HUGH HUNTER.

Free Miner's Certificates issued.....	158
Mineral Claims recorded.....	137
Transfers.....	33
Certificates of Work issued.....	46

## KAMLOOPS DIVISION.

Near Kamloops, one of the most important towns of the interior, and a divisional point of the C. P. R., considerable interest has been aroused during the past two years by the discovery of copper ore on Coal Hill. Coal Hill lies about three miles south of the town, and consists for the most part of treeless, gently sloping hills with some rock exposures, in which have been found the copper-stained decomposed material capping the copper-impregnated rock beneath. A short visit was made here in September.

**Geology.** Dr. Dawson, in his geological report on this district, classes the rocks of Coal Hill as the "Plutonic Rocks," which, he writes, "though in all cases intrusive in their relations to the other rocks, vary considerably in character. The larger areas are, however, almost exclusively occupied by gray, granitic rocks of different types, but between which no distinct lines can generally be drawn. Syenites occur in some places, and on Kamloops Lake and westward along the Thompson valley considerable areas of gabbro, closely associated with the granites, are included under the same colour. The chief granitic intrusions have occurred about the close of the Triassic period, but some later granites are found cutting through Cretaceous rocks." (See explanatory notes, Kamloops sheet).

**Ore and Ore Deposits.** In this granitoid or gabbro mass of Coal Hill run, in various directions, fractures along which are found the gabbro more or less impregnated with chalcopyrite, magnetite, iron pyrites, etc., in which material are some gold and silver values. Not much work has been done on any of the many locations, but on the "Iron Mask" quite a shute of copper pyrites and magnetite has been found, while on the "Lucky Strike" a good body of solid chalcopyrite was uncovered.

So far, all the "showings" have proved to be not large, and to carry no high values in gold and silver, but should more extended work, which is much needed here, prove up ore-shutes of size and better values, the facilities for easy mining and transportation will be excellent.

About all the work in progress is that being done on the "Lucky Strike," and this will serve, to some extent, to demonstrate the conditions existing here. Litigation has stopped advance on the "Iron Mask," and the work on many of the other claims has proved up very little or nothing, as yet.

## MINING CLAIMS.

**Iron Mask.** After running a short cross-cut, a drift runs for 60 feet along a ledge of magnetite and copper pyrites in the decomposed gabbro. The vein of solid material varies in width from 3 to 18 inches, but the ledge is wider. By open cuts this ledge can be traced for a considerable distance, but all work has been stopped for some time.

**Erin.** On this claim, owned by Mr. Beattie, *et al*, supposed to be the northern extension of the "Iron Mask," some work was showing up a large amount of gossany material, in which were some copper sulphides. Assays of this material had run as high as \$18 in gold, but work had not proceeded far enough to reach the unaltered mass. The "Bonnie Etta," "Jubilee" and "Norma" show some copper-stained rock, and in a 40-foot shaft on the "Jubilee," some solid copper pyrites were found in the bottom.

**Lucky Strike.** This fractional claim was bought by Mr. Jno. Cobeldick for \$5,500, who has also bonded the surrounding claims. Out on the open, flat copper-stained rock led to a little work being done that exposed a mineralized zone traceable for some distance, where at one point about 6 feet of nearly solid copper pyrites were stripped. Here a shaft was being sunk (20 feet deep, Sept. 30th), in which this ore-body was seen to break up into irregular stringers. Open cuts were being dug to trace the continuation of this lead, while about 8 tons of clean copper ore had been sorted and sacked. This ore carries some gold values, but how much was not ascertained. Work is still in progress at this shaft.

**Iron Cap.** On this claim, one mile south-west of the "Iron Mask," a 70-foot inclined shaft had been sunk, in which some mixed ore or rock, impregnated with copper and iron pyrites, had been found, or material assaying from \$6 to \$10 in gold.

No work was being done here. Mr. Tunstall reports that "five tons sent to Everett smelter returned \$58 in gold and copper."

**Bonanza.** One and a half miles south-west of "Iron Cap," owned by Wm. Ford, A. Darby *et al.* A shaft had been sunk 53 feet and a cross-cut run 60 feet where the gabbro was impregnated with a very small amount of copper sulphides, carrying small gold values. On the next claim, the "Pot Hook," was found copper-stained surface rock. No work was being done here.

**Copper King.** This, and two other claims owned J. H. Hill *et al.*, are located 1.5 miles south of the Glen Iron mines, and near Mr. Roper's ranch, in a small area of gabbro. Here a 25-foot shaft had been sunk along a narrow vein of mixed ore, carrying bornite and chalcopyrite, reported to assay well in silver and gold. About 3 tons of this mixed ore was on the dump, but very little was in sight in the shaft.

**Python.** This and some other claims, owned by W. F. Wood *et al.*, the first location on Coal Hill. A shaft has been sunk 80 feet, following narrow stringers of copper pyrites and magnetite that ramify irregularly through the mass of rock, itself also slightly impregnated with these minerals. Several tons of very mixed ore were on the dump, but no body of ore had been exposed. This ore carries some gold and silver, but how much was not learned. No work was being done.

**Jacko Lake.** Several claims in the vicinity of this lake were visited, but very little could be seen, except on some claims some copper-stained rock, but no solid copper sulphides.

#### REPORT BY MR. G. C. TUNSTALL,

GOLD COMMISSIONER, KAMLOOPS.

The following report for 1897 by the Gold Commissioner is here appended :—

#### KAMLOOPS DIVISION.

**Placer Mines.** "Very little placer mining has been done the past year. A few Chinese still manage to make small wages on Tranquille and Scotch Creeks.

"The Thompson River Hydraulic Mining Co.'s property has lain idle, pending negotiations for its sale. The mining leasehold acquired by Mr. J. H. Russell was worked for a short time, but the depth of ground has increased to so great an extent that the adoption of the hydraulic process will be necessary to make it profitable.

#### "NORTH THOMPSON RIVER.

**Mineral Claims.** "Considerable prospecting was done the past summer along this river and its tributaries, resulting in some good prospects being found. No assessment work has yet been recorded, therefore little is known of their value.

#### "JAMESON CREEK.

"This creek, favourably reported on by Dr. Dawson some years ago, empties into the North Thompson River on the west side, about 12 miles above Kamloops. Some 10 or 12 locations have been recorded. The quartz lodes, six in number, exist in a granite formation, and run parallel to each other. Assays average from \$5 to \$36 in gold. These claims are accessible, and possess an unlimited supply of wood and water.

#### "DIXON CREEK.

"Very fine copper and silver ore has been found on this creek, where work is being done. A tunnel has been run in one of the locations for 35 feet on the ore-body of clean smelting ore, carrying pay values in gold and silver.

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"SKULL CREEK.

"On this creek, situated about 20 miles above Jameson Creek, several claims have been recorded. They lie in a belt of country much contorted and completely mineralized with pyrites.

"MANSON CREEK.

"Manson Creek is on the divide leading to Shuswap Lake. Two claims have been recorded, the 'Manson' and 'Imperial.' The ledge is from 2 to 6 feet in width, from which 700 pounds of picked ore were shipped for a smelter test, with a return of 500 ounces silver, \$4 in gold, 7 per cent. lead, and 10 per cent. copper to the ton.

"BIG SHUSWAP LAKE.

*Blue Bird.*—This was probably the most important discovery made the past year in the Kamloops Division. It is attracting wide-spread attention through a report made by Mr. T. Newman, and printed by the owners for circulation. The location is about four miles north of Sicamous and close to the lake. The vein is 50 feet wide, and is visible in the face of a steep bluff with a surface exposure of not less than 3,000 feet in length. The ledge matter, reported to be solid ore, resembles that in the best Rossland mines. The assay made averaged \$29.32 in gold to the ton, and as high as \$698 in gold, besides copper, has been obtained in assays of choice samples. Transportation can be effected by water to the C. P. R., a distance of four miles, at a trifling cost.

"KAMLOOPS LAKE.

Glen Iron Mines.—"The Glen Iron Mining Co. has exported during the past year 2,000 tons of iron ore for fluxing purposes, to the Everett smelter, Everett, Wash., and another contract for 500 tons is expected to be filled in the spring.

"COPPER CREEK.

"Besides the usual assessment work there has been no development done since last May. Good offers to bond these copper claims have been refused, which would now be accepted.

"The claim-owners, not in possession of sufficient means to develop their properties, are waiting for purchasers to acquire their rights.

"THE CINNABAR MINING CO.

"The furnace belonging to this company was started the latter part of March, but only ran for a short time, as it was seen that some alterations would have to be made before the ore could be treated successfully, the results not being satisfactory.

"The prospecting of the deep ground with a diamond drill before commencing some tunnels, cross-cuts and winzes in the 'Blue Bird' and 'Rosebush' claims, was contemplated, but for some reason this work has not been accomplished. The Cariboo Gold Fields Co. has completed assessment work on a number of cinnabar claims on the north side of Kamloops Lake, but more labour will be required to determine their value.

"HARDIE MOUNTAIN.

"Assessment work was done on the 'Idria,' 'Almaden' and others. The 'Columbia' has a tunnel 145 feet long, with fairly good furnace ore in the face, running from 1 to 2 per cent. mercury at a depth of 110 feet from the surface, showing conclusively that the ore extends downward that distance from the surface. Upon the completion of 100 feet more of tunneling, cross-cuts will be made to thoroughly test the body of mineral. These works have succeeded in draining the surface water of the 'Idria' and 'Almaden' mines, and will permit the sinking of shafts on these properties without any difficulty from water.

"CHRIS AND DEADMAN CREEKS.

"The Cariboo Gold Fields Co. own a number of cinnabar claims on these creeks. The broken up and irregular formation of this section of the country has prevented any well defined body of ore being found without the expenditure of a considerable amount of money. Richard Williams and others have done some superficial work on cinnabar locations on Chris Creek,

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with satisfactory results. Indications point to the existence of good bodies of ore in the vicinity. A number of quartz locations have also been taken up, containing gold, but the ore is of a low grade character.

“MAMMETTE LAKE.

“Mammette Lake, about thirty miles south of Savona, is connected with an excellent road running from Savona into the Nicola Valley. In the vicinity of the lake Messrs. Dupont, Wilson, Ferguson and others have located a number of copper claims. The ore found in a porphyry dyke, is an iron oxide carrying, it is said, from 12 to 33 per cent. copper, and a small quantity of gold. The surface is badly broken up, and no well-defined vein has yet been discovered. The mineral is found cropping out on the surface in large, isolated bodies, varying in width from 4 to 20 feet. A tunnel has been run in on the ‘Eagle Boy’ a distance of 60 feet without finding vein matter. The rich assays obtained, and the knowledge that an extensive deposit must exist close by to their works, have encouraged the proprietors to steadily persevere in carrying on their operations.

“STUMP LAKE.

“The silver mines at Stump Lake again attracted attention during the past year. Some of the old claims, whose titles had expired, have been re-located, whilst new discoveries have been staked off and recorded.

“QUILCHENA.

“The country around Quilchena was prospected to a limited extent, and several claims taken up. The croppings contain copper and gold assaying sufficiently well to warrant further exploration.

“NICOLA LAKE.

“Several very promising claims have been located within a radius of several miles of this lake, a few of which may shortly be bonded, which is certain to give an impetus to mining in this district. About one mile east from the town and 300 yards from the waggon road a large deposit of iron (in a species of limestone) was discovered, running in a south-easterly direction for several miles, upon which many locations have been staked.

“On one of the locations, the ‘Triumph,’ an open cut 16 feet long and 10 feet deep has been made. Various assays from the carbonate ore range from nil to \$84 in gold to the ton.

“CLAPPERTON ON MILL CREEK.

*Peacock.* “On the above claim a large deposit of mineralized quartz was discovered the past summer, containing principally peacock copper ore. Much of the ledge matter assays \$5 in gold and \$15 and more in copper to the ton. The ‘Boulder Cap,’ an extension of the above, upon which work was commenced last fall, showed at a depth of ten feet a similar deposit. There are in all some twelve claims located, a few of these having very fair surface indications, but having been staked at a later date very little is known of their value.

“Several bodies of carbonate ore have been discovered in the vicinity of Nicola Lake, and some few weeks since fine specimens of metallic copper ore were brought in from about ten miles north of the lake, the vein matter showing up through a granite formation. Assessment work has been done on most of the claims in this vicinity. The principal locations adjoining the waggon road are the ‘Jupiter’ and ‘Victoria’ which show chalcopryite containing gold in a limestone formation.

“Five miles across the valley in a south-easterly direction from the group last-mentioned, two claims were staked last year, the ‘Toronto’ and ‘Halton,’ that have an iron-capping beneath which some rich ore was discovered carrying gold and silver.

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## YALE DIVISION.

"Less industrial mining was carried on in this Division than in 1896, but other branches of mining are assuming more importance.

**River Dredging.** "The history of river dredging on the Fraser and other rivers in the Province, has been associated with failure since the first introduction of machinery designed for that purpose. The promoters were persons without any mining experience, entirely ignorant of the obstacles to be overcome, and of the best means to avoid them. These devices, which excited the amazement of the old miners, most of whose lives had been spent in mining on the Fraser, but whose advice was deemed unworthy of notice, consisted principally of powerful centrifugal pumps supposed to be able to suck up the auriferous gravel from the bottom without the slightest difficulty, but in practice they, unfortunately, brought up stones with greater facility, which constantly choked the pipes and caused many delays.

"There were also other devices constructed of a more impracticable nature, which only betrayed the little knowledge possessed by their inventors of the work they had to accomplish. It is therefore pleasing to note the comparative success attending the operations of the Beatty Gold Mining and Dredging Co., which are still in progress below North Bend, on Boston Bar. The dredge referred to is provided with a shovel or dipper under perfect control of the machinery, capable of being swung around and submerged anywhere within a certain radius, and with a capacity at each hoist of  $1\frac{1}{2}$  tons of gravel in less than one minute. The amount of material raised per diem is estimated at 800 cubic yards, and this is deposited on an incline iron grating, or 'grizzly,' lying on a scow moored alongside by which the large rocks are deposited in the river, while the smaller stones and gravel are carried into a dump-box placed underneath, and run thence into sluice boxes furnished with different kinds of plates, riffles and undercurrents, supplied with quicksilver to save the fine gold.

"The shovel raises a certain amount of water, but not sufficient to run off the gravel, and a further supply for washing is provided by means of a dump. The gold is found beneath a layer of boulders lying at or near the surface of the river bottom. Difficulty is frequently encountered in moving the scow by reason of the large rocks precipitated from the 'grizzly,' forming a bar in a comparatively short time, but measures will be taken to avoid this obstacle in future. The machinery is capable of working to a depth of 26 feet.

"As no coarse gold has been obtained, I would infer that operations did not extend as far as the bedrock, where it should be found in large quantities in the crevices and seams, under conditions which may probably render its recovery a difficult matter. The mining season is confined to the period of low water. Work began on the 30th August last, and has continued with some interruptions to the present date, and will be carried on through the winter, provided no severe frosts intervene. The shareholders are so well satisfied with the returns obtained, \$7,000, that it is the intention to construct several more dredges of the same description to work on the various stretches of the river they now hold under lease. The cost of this dredge was \$18,000, and seven men are employed.

**Hydraulic Mining.**

"The past season was not a favourable one for hydraulic mining, owing to a short water supply. The early part of the summer was hot, and no rain fell from the month of June until September.

**"THE OTTAWA HYDRAULIC MINING AND MILLING CO.**

"The most extensive mining enterprise operating on the banks of the Fraser, about one half mile below North Bend, did some work in 1896, but commenced late in the past season in consequence of necessary repairs to the flume, and the scarcity of water at the end of August, which was totally insufficient to supply the two monitors. Very fair results were, however, obtained from the wash-ups made.

"The Agnes Hydraulic Mining Co.'s property is located near North Bend, on the right bank of the Fraser River, and extends from the railway track to the water's edge. The greater part of the summer was spent bringing the water in a flume from two creeks, a distance of one and one half miles, so that very little ground was washed.

"Ashcroft Gold mining Co.—This mining leasehold lies about one mile below Keefers, and consists of a bench adjoining the railway track. The summer was spent in constructing a ditch and flume. The pipes have been laid in position and everything is in readiness for

work when the spring opens. The ground, I understand, prospects very well, and is considered one of the best locations on the Fraser.

**Gold Yield.** "The following is the yield of gold for the past year, also revenue from mining receipts:—

Hope.....	\$ 800
Yale.....	11,600
Spuzzum.....	3,172
North Bend.....	3,234
Keefers.....	1,500
Lytton.....	16,369
Spence's Bridge.....	700
Ashcroft.....	6,000
Ottawa Hydraulic Mining Co.....	2,000
Agnes Hydraulic Mining Co.....	300
Beatty Gold Mining and Dredging Co.....	7,000
Taken away in private hands.....	5,000
Grand total.....	\$58,675

#### "MINERAL CLAIMS.

Queen.—This Company has been engaged developing their property the past season by extending the tunnel 150 feet to strike the ledge. One and one half miles of road have been constructed.

#### "SIWASH CREEK.

"The claims on this creek have only had assessment work performed on them.

#### "SALMON RIVER.

"Allan, Grisby & Co. have been engaged driving a tunnel in their location with encouraging prospects.

#### "SUMMIT CAMP (near Hope).

"Murphy & Co. are said to have discovered rich and extensive bodies of galena ore, and they intend to push work vigorously this year.

#### "THOMPSON RIVER.

"In the neighbourhood of Lytton a large number of mineral claims have been staked. Excellent assays have been obtained from the ore, which chiefly contains gold. Some development work has been accomplished, but not enough to determine the value of the locations.

"The 'Faith' claim has been bonded by Mr. John Francis. It is situated along the Thompson River, and a tunnel has been driven 70 feet. The rock, from which some very rich assays have been obtained, being reported free milling.

"'Lily May,' two miles east of the 'Faith,' is a copper proposition, and a tunnel has been driven 90 feet, showing some good ore."

### MINING MACHINERY.

The following list of mining machinery installed at the various mines in the Province, and the list is not complete, will afford some idea of the progress made during the past four years. With the exception of the "Le Roi" and "War Eagle," no very large plants have yet been erected, but it will be seen that there is now a comparatively large number of properties equipped for development and mining.

Both the Rand and Ingersoll-Sergeant Companies have manufactories established in Canada, which have supplied most of their machinery in this list. The Jenckes Machine Company has its works at Sherbrooke, Que. At Vancouver, the B. C. Iron Works Co., Ltd., have recently greatly enlarged their works for the special manufacture of mining machinery, which is also constructed in Victoria at the Albion Iron Works. At Peterboro, Ont., the Wm. Hamilton Man. Co., Ltd., are under licence from the Edward P. Allis Co., of Milwaukee.



For the details of the list below, the writer is indebted to J. D. Sword, agent for the Ingersoll-Sergeant Drill Co., and T. R. Mendenhall, Rand Drill Co., Rossland.

The total estimated values by this list amount to \$750,000.

#### ROSSLAND.

*Le Roi.*—One 40-drill cross Corliss and one 5-drill Rand compressors; three 125-h.p. and one 100-h.p. Ingersoll boilers; one 80-h.p. and one 40-h.p. Fraser and Chalmers boilers; 15 Rand and 17 Ingersoll-Sergeant drills; one large 300-h.p. direct acting winding engine, made by Ingersoll Drill Co., and 3 small hoisting engines; sinking pumps; electric light plant, including one 40-h.p. Westinghouse engine; machine saw for framing timbers, etc. Total cost, \$70,000.

*War Eagle.*—One 20-drill cross Corliss Rand air compressor; two 100-h.p. Ingersoll boilers; one geared hoisting engine, Fraser and Chalmers; 3 Rand and 13 Ingersoll-Sergeant drills; one Knowles and one Cameron sinking pump, etc. Total cost, \$30,000.

*Columbia-Kootenay.*—One 30-drill Corliss Ingersoll-Sergeant compressor; three 100-h.p. boilers; one 10 by 12 hoisting engine; 7 Rand drills. Total cost, \$28,000.

*Josie.*—One 5-drill Ingersoll-Sergeant compressor; one 60-h.p. boiler; 7 Ingersoll drills; one 8 by 10 hoisting engine; one Northey sinking pump. Total cost, \$10,000.

*Rossland-Red Mountain.*—The Jenckes Machine Co. and Rand Drill Co. supplied one 5-drill compressor; 3 drills and one 60-h.p. boiler. Cost, set up, \$6,000.

*Centre Star.*—One 7-drill compressor, and one 80-h.p. boiler, Ingersoll Co.; 2 Ingersoll, and 3 Rand drills; one small hoisting engine. Cost, set up, \$8,000.

*O. K.*—One 10-stamp mill (Jenckes Machine Co.); one 4-drill Rand compressor with drills. Cost, set up, \$17,000.

*Nickel Plate.*—One small boiler; 1 hoisting engine; 1 Knowles' sinking pump. Cost, \$4,500.

*Iron Mask.*—One 10 by 14 hoisting engine, Fraser & Chalmers; 3 Ingersoll-Sergeant drills; one sinking pump. Cost, \$4,500.

*Great Western.*—One 6 by 8 hoisting engine (Jenckes); one 30-h.p. boiler; 2 Rand drills; Northey sinking pump. Cost, \$4,000.

*Monte Cristo.*—One 7-drill, Ingersoll, and one 3-drill Rand air compressor; one 80-h.p. boiler; 8 Ingersoll drills; receiver, pipe-line, etc. Cost, \$9,000.

*Virginia.*—One 6 by 8 hoisting engine (Jenckes); 2 Rand drills; air receiver, etc. Cost, \$3,500.

*Iron Colt.*—One 4-drill Ingersoll air compressor; one 40-h.p. boiler; 2 Rand and one Ingersoll drills. Cost, \$5,000.

*Cliff.*—One 2-drill Rand compressor; one 50-h.p. boiler; 2 Rand drills. Cost, \$3,500.

*City of Spokane.*—One 4-drill Rand compressor; one 50-h.p. boiler; 2 Abner Doble drills. Cost, \$5,000.

*Lily May.*—One 4-drill Ingersoll compressor; one 60-h.p. boiler; one 6 by 8 hoisting engine; 2 Ingersoll drills. Cost, \$6,000.

*Commander.*—One Ingersoll vertical boiler and hoisting engine; one Rand drill. Cost, \$3,500.

*Homestake.*—One 5-drill Ingersoll compressor; one 80-h. p. boiler; one 8x10 hoisting engine; one sinking pump; 5 Ingersoll drills. Cost, \$10,000.

*Crown Point.*—One 4-drill Rand compressor; one 60-h. p. boiler; 3 Rand drills; receiver, etc. Cost, \$6,000.

*Deer Park.*—One 50-h. p. boiler; one 30-h. p. hoisting engine; one Northey sinking pump. Supplied by Ingersoll-Sergeant Drill Co. Cost, \$4,500.

*Sunset No. 2.*—One 7-drill Ingersoll compressor; one 80-h. p. boiler; one 30-h. p. hoisting engine; one sinking pump; 4 Ingersoll drills. Cost, \$14,000.

*Mayflower.*—One 30-h. p. hoisting engine and boiler. Cost, \$3,000.

*Nest Egg.*—One 4-drill compressor; one 60-h. p. boiler; 3 drills; all supplied by Rand Drill Co., but since removed. Cost, \$5,500.

*Blue Bell.*—One 25-h. p. boiler and small hoisting engine; one Rand drill. Cost, \$2,000.

*Robert E. Lee.*—One 7-drill air compressor; one 100-h.p. boiler; one 30-h.p. hoisting engine; 6 drills; one sinking pump, etc.; all supplied by Ingersoll-Sergeant Drill Co. Cost, \$12,000.

*Silver Bell*.—One vertical boiler with hoist (Jenckes). Cost, \$2,500.

*Velvet*.—One 30-h.p. boiler, hoisting engine, etc. Cost, \$3,000.

#### NELSON DISTRICT.

*Hall Mines*.—(At mine) two 10- and one 4-drill Ingersoll compressors; five Ingersoll boilers—three 60-h.p., one 80-h.p., and one 40-h.p.; one 16x36 Corliss engine; 22 Ingersoll-Sergeant drills; rock crusher; two hoisting engines; two Sullivan diamond drills; air receivers, pipe lines, machine shop, etc. Cost (exclusive of aerial tramway and smelter), \$50,000.

*Poorman*.—One 10-stamp mill; one 3-drill Rand compressor; one 20-h.p. hoisting engine and boiler; two Rand drills. Cost, 16,000.

*Fern*.—10-stamp mill; 3-rail gravity tramway. Cost, \$33,000.

*Dundee*.—One 30-h.p. boiler and hoist; two Ingersoll drills; one Northey sinking pump. Cost, \$5,000.

#### SLOCAN DISTRICT.

*Slocan Star*.—One 120-ton concentrator, machinery from E. P. Allis Co.; one 4-drill Rand compressor; two 50-h.p. boilers; two Rand and one Ingersoll drills. Cost, \$40,000.

*Galena Farm*.—One 6-drill Rand compressor; one 40-h.p. boiler; three Rand drills; one large water-power hoisting engine, Pelton wheel, etc.; three sinking pumps—one Northey, one Cameron, 1 Knowles. Cost, \$15,000.

*Dardanelles*.—One 3-drill Rand compressor; one 40-h.p. boiler; two Rand drills. Cost, \$5,000.

*Antoine*.—One 20-h.p. boiler and hoisting engine; one small sinking pump. Cost, \$3,000.

*Lucky Jim*.—One Rand 3-drill compressor, with two drills; one 40-h.p. boiler. Cost, \$5,000.

*Noble Five*.—One 120-ton concentrator (E. P. Allis Co.); one Finlayson aerial tramway (Colorado Iron Works, Denver). Cost, \$60,000.

*Washington*.—One 40-ton concentrator (Jenckes). Cost, \$10,000.

*Ruth*.—One Ingersoll 5-drill compressor, with 6 drills; one 80-h.p. boiler (Robb); one saw-mill, with 10x16 engine (Wm. Hamilton Co.). Cost, \$12,000.

*Alamo*.—One 75-ton concentrator, with Pelton wheel; 3-rail tramway. Cost, \$35,000.

#### AINSWORTH DISTRICT.

*Highlander*.—One Jenckes hoisting engine and boiler. Cost, \$3,500.

*No. One*.—Concentrator.

*Canadian Pacific M. & M. Co.*—One 50-ton concentrator; one 10-drill Ingersoll drill, with 4 drills, Pelton wheel, etc. Cost, \$14,000.

*Montezuma*.—One 100-ton concentrator and aerial tramway; one 2-drill Rand compressor with one drill, operated by Pelton wheel.

*Blue Belle*.—One 12-inch Allis air compressor; one 50-h.p. boiler; two Rand and two Ingersoll drills. Cost, \$6,000.

#### BOUNDARY CREEK.

*B. C.*—One 3-drill Rand compressor and drills; one 40-h.p. boiler (Jenckes). Cost, \$5,000.

*Winnipeg*.—One small vertical boiler and hoisting engine (Jenckes). Cost, \$2,000.

*Golden Crown*.—One 50-h.p. boiler; one 30-h.p. hoisting engine; one Knowles sinking pump. Cost, \$2,500.

*Jewel*.—Vertical boiler and hoisting engine; sinking pump. Cost, \$2,000.

#### OTHER DISTRICTS.

*Tinhorn, Fairview*.—Stamp-mill, &c. Cost, \$33,000.

*Cariboo, Camp McKinney*.—Stamp-mill, hoisting engine, compressor, &c. Cost, \$32,000.

*Lanark, Illecillewaet*.—Concentrator, Otto tramway, electric plant, &c. Cost, \$70,000.

*Golden Cache, Lillooet*.—10-stamp mill and 3-rail gravity tramway. Cost, \$20,000.

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## COAL MINES.

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BY A. DICK, INSPECTOR OF COAL MINES.

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“The collieries in operation during the past year, 1897, were:—

“The Nanaimo Colliery of the New Vancouver Coal Mining & Land Company, Limited.

“Wellington Colliery, owned by Messrs. R. Dunsmuir & Sons.

“Union Colliery, of the Union Colliery Company.

“The Wellington Colliery Company's Mines, Alexandra Mines, and West Wellington Colliery, owned by the West Wellington Coal Company, Limited.

“The output of coal for 1897 amounted to  $892,295\frac{19}{20}$  tons, produced by the several collieries as follows:—

	Tons.
“Nanaimo Colliery .....	319,343 $\frac{14}{20}$
Wellington Colliery .....	297,611 $\frac{15}{20}$
Union Colliery .....	265,642
Wellington Colliery Company's Mines .....	6,000
Alexandria Mine .....	3,375
West Wellington Colliery .....	323 $\frac{10}{20}$
<hr/>	
* Total output for the year 1897 .....	892,295 $\frac{19}{20}$
Add coal on hand at 1st January, 1897 .....	48,111 $\frac{13}{20}$
<hr/>	
Total coal for disposal .....	940,407 $\frac{12}{20}$

“The export of coal by the collieries for 1897 was as follows:—

“Nanaimo Colliery .....	231,986 $\frac{10}{20}$
Wellington Colliery .....	211,662 $\frac{5}{20}$
Union Colliery .....	176,212
<hr/>	
Total coal exported in 1897 .....	619,860 $\frac{15}{20}$
Home consumption .....	290,309 $\frac{10}{20}$
Coal on hand 1st January, 1898 .....	30,237 $\frac{7}{20}$

“The returns for the year show a home consumption of coal amounting to  $290,309\frac{10}{20}$  tons as against  $261,983\frac{12}{20}$  tons last year (1896). It must, however, be noted, that the coal used in and about the collieries is, in most instances, under this heading.

“In addition to the stated home consumption of coal for 1897, we consumed in British Columbia 14,528.5 tons of coke, and exported 2,573 tons to California, U. S., leaving 730 tons on hand on 1st January, 1898, being a total of 17,831.5 tons, all of which was manufactured at Union Colliery, Comox. In connection with this colliery there are one hundred ovens of the bee hive pattern, which are all at work turning out a first-class coke, for which there is a good market both in British Columbia and in San Francisco, and also wherever it has been tried. Now the Union Colliery company is building a second hundred ovens for the coke-making business; these are on the same pattern as the first, and are all expected to be in operation early in the summer. The company will be in a position to fill orders that they have now to refuse. The time has

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\* This total is more than the amount telegraphed by Mr. Dick, February 7th, and embodied in the foregoing tables, pp. 455-457.—W. A. C.

arrived when it is not necessary to send out of the country for a first-class coke, this being now manufactured in British Columbia, and equal to any that can be imported.

**Fire Clay.** "There is yet another first-class article that is the product of our mines that I will mention here—that is a fire-clay, of which the output for the past year was 1,628.7 tons, all of which was sold—the greater part of it made into brick, which are now being built into the ovens now under construction by the Union Colliery Company.

**Coal.** "The coal exported was shipped at the ports of Nanaimo, Departure Bay, and Union (near Comox), Vancouver Island, in British Columbia. The exports were principally made to San Francisco, San Pedro and San Diego, in California, U. S. A. Shipments were also made to the States of Oregon and Washington, to Alaska and Petropauloski, and Hawaiian Islands, and there was one shipment made to Central America.

"In order to show the standing of the British Columbia Coal in the California market, I append the following return for the year 1897:—

"COAL IMPORTED INTO CALIFORNIA, 1897.

	Tons.
" British Columbia coal .....	558,372
Australia " .....	281,666
English " .....	107,969
Scotch " .....	4,081
Eastern " .....	21,335
Seattle " .....	220,175
Carbon Hill " .....	286,205
Diabolo, Coos Bay " .....	115,150
Japan, Alaska, etc. " .....	6,587
Total. ....	1,601,540

"The total deliveries of coke in San Francisco this year amounted to 30,320 tons, of which the Union Colliery Company, British Columbia, gave 2,573 tons, and 1,889 tons came from Australia. Now that we have made our first year's shipments of coke—a first-class article, all those who have used it being well satisfied with its quality, and the coke being in great demand by those who have used it—doubtless the Union Colliery Company will be making regular shipments to the California market henceforth.

### NANAIMO COLLIERY.

"This colliery is owned and worked by 'The New Vancouver Coal Mining and Land Company, Ltd.,' whose head offices are in London, England.

"No. 1 SHAFT (ESPLANADE), NANAIMO CITY.

"I have, in a former report, already explained that this shaft is situated within the corporate limits of Nanaimo City. It may be said to be the most extensive mine in this district, and to have its working face at a further distance from the bottom of the shaft than any other mine in the Dominion of Canada. By steady and progressive working, the face is now fully three miles from the bottom of the shaft, and at present no limit can be placed at the distance to which it may not in time be extended. With the exception of a small area around the bottom of the shaft, all of the workings of this extensive mine are situated beneath the waters of Nanaimo Harbour, the surface of Protection (or Douglas) Island and Newcastle Island. The workings are likewise being extended deeply below ground, under the Gulf of Georgia, from the north side of Newcastle Island, and at present most of the working faces are under the last-mentioned island. As to their condition, I might say that they are dry, but not dusty, and are quite safe from any influx of water from above, there being a thickness of rock and débris varying from 450 to 1,600 feet between the bed of the harbour and the workings of the mine. All of the workings of this mine have been carried on on the pillar and stall as well as on the panel system. Fully two-thirds of the coal are left in pillars of large dimen-

sions to support the heavy pressure from above, with the full knowledge that they can be removed at some future time after they have served their present useful purpose. In two or three places, where the removal of the pillars could do no harm, and where their retention served no purpose, they have begun to take them out, and so far with good results.

#### "No. 1, NORTH LEVEL.

"In some of my previous reports I have given a very full description of this level, which is undoubtedly the longest hauling road in this district. The coal found within its workings has been very good, and has varied in thickness from 3 to 10 feet. At the face the roof is generally good. Though the coal has been good, the mine itself has not been without its faults, and has at times given the management much trouble. With the exception of the pillar coal taken out of Nos. 2 and 3 levels, all of the coal taken from No. 1 shaft comes from the No. 1 level.

#### "THE SLOPE.

"In addition to the levels above mentioned, there is a slope, which branches off from the No. 1 level at about 50 yards from the shaft, and runs in a northerly direction. This slope is now down 2,100 yards, and lies 1,600 feet vertically, beneath tide water. This slope has run through much faulted ground, and the coal is not extra good in the face at present.

#### "VENTILATION.

"The workings of this extensive mine are ventilated by a large 'Guibal' fan, 36 feet in diameter by 12 feet wide, driven by a large steam engine, running at a speed of 46 revolutions per minute, and keeping the air current in motion at the rate of 102,000 cubic feet per minute, with a water-gauge standing at one and nine-tenths.

"This mine is ventilated on the separate-split system, and the air supply is distributed as follows:—

"To main slope . . . . .	35,000	cub. ft. per min.	for men about shaft and stable.
" No. 1 incline . . . .	21,000	" "	66 men.
" pillars in incline .	5,680	" "	21 "
" No. 2 incline . . . .	13,000	" "	56 "
" pillars in No. 2 and			
No. 3 levels . . . .	27,320	" "	40 "

"In addition to supplying the foregoing number of men with the requisite air, there are also 20 mules scattered about in different parts of the workings, who also draw on the above ventilation. It must be borne in mind that these men and mules are those employed on one shift only. The intake to this fan shaft is the Protection Island shaft, with which it is connected beneath the waters of the harbour. At this part of my Report, it may not be out of place to mention that the New Vancouver Coal Company have for the past five years been hauling the coal out of the levels with the aid of electricity, and so far with great success. The plant was supplied and fitted up by the Edison General Electric Co. The dynamos, (driven by a steam engine) being situated above ground, about 100 feet from the mouth of No. 1 shaft. From the dynamos the current is carried down the No. 1 shaft, and thence distributed wherever it is required. The wires are insulated at all places where from their position they might prove dangerous to the men or animals. For hauling purposes the wires are strung for a distance of two miles, which represents the haulage done by the locomotives. To do the work the company purchased four electric locomotives, one small motor of 15-horse power, and three of 30-horse power, of 8 tons each. They work easily, and are well under control, and come up in every way to the expectations of the company. Their usual rate of travelling is about 8 miles an hour and not unusually with a load of 60 or 70 tons net behind them. In addition to the hauling of coal, the dynamos also supply the bottom of the shaft, sidings, and engine houses with light in the form of the electric spark.

#### "PROTECTION ISLAND SHAFT.

"This shaft is also the property of the same company, and is situated on the south point of Protection (or Douglas) Island. The workings of this mine are now from the slope on both the north and south sides of the shaft. The slope on the south side going due east is down 1,700 yards, lying 1,740 feet (vertically) below the surface of the water, at the entrance to

Nanaimo harbour. The slope on the north side is down 1,490 yards in a north-easterly direction, and at that distance is 1,200 feet below the surface of the tidal water of Northumberland Channel. This mine was worked from the 1st January, last, to the 31st July, when the condition of the coal trade would not justify the company in keeping it open any longer, as what demand there was could be met by the output from the other mine. It was, therefore, temporarily shut down, throwing fully 200 men out of employment. The company put to work as many of these men as they could find openings for, in No. 1 mine; but there are still a large number out of work. It is the intention of the management, just as soon as the condition of the coal trade justifies it, to re-open this mine, when it will only take a few days to put it in running order again.

#### " VENTILATION.

"The ventilation was good up to the time of inspection, and although there are not any miners at work, the air current is still kept through the mine.

#### "No. 5 SHAFT (NANAIMO COLLIERY).

"This mine, which likewise belongs to the New Vancouver Coal Co., is what is known as the Southfield Mine, being in the southern part of their large estate. The workings from this shaft are all to the eastward, and are on the pillar and stall system. The management have been much troubled with faults of one kind and another, and have not as yet got clear of them, although during the past year there has been much improvement in the coal. The coal mined here is of a very good quality, and in some places is twenty-two feet thick.

"This mine is worked and ventilated in two different districts, known as the East Level and East Incline Divisions. In the East Level all the mining is done in the extraction of pillars (coal), which are large and generally thick, so the product is generally good large coal. In the East Incline all of the mining is on the pillar and stall system, leaving the pillars to support the roof. Eventually when they are no longer required they will be taken out.

#### " VENTILATION.

"The ventilation is good, the motive power being a double fan worked by a steam engine. When I was down in December there were 47,320 cubic feet of air travelling through the works per minute, supplying ventilation for 64 men and 5 mules. It was divided as follows :

To East Level	—30,000 cubic feet per minute for 50 men and 4 mules.
" Incline	—17,320 " " 14 " 1 "

"The air is well conducted into the places where the men are at work, and the mine itself is free from dust and in good order. This mine is connected with the surface by means of the No. 4 slope, and although there is no mining being done in this slope, yet the air current is kept up throughout the works as though there was. The number of men which I have enumerated as above represents those on one shift only.

#### " PROSPECTING.

"For this purpose the New Vancouver Coal Co. employ a large staff. A portion of the prospecting is done within the mine itself, in parts where the existence of coal is a speculative probability, and in other places by means of the pick and shovel; but the diamond drill is the most far reaching instrument of which they avail themselves. I have in a former report stated that a bore hole had been sunk on the mud flat at the mouth of the Nanaimo River to a depth of a thousand feet, but this bore has since been discontinued. I have never ascertained the exact depth to which the bore was carried, but it was some considerable distance further than that mentioned, and the results were, I understand, satisfactory to the Company. The drill has a short time back been employed at a spot near the Indian Reserve, at the mouth of the Nanaimo River, when a hole was sunk to a depth of 1,200 feet, and in going down the drill passed through a workable seam of coal. It is now being removed to another place, where I hope they will be successful in finding a seam (or some seams) of coal of sufficient thickness that will justify the Company in sinking a shaft, and ultimately making a success of it.

"Nothing has been done by the N. V. C. Co. at their new opening near the E. & N. R. Co.'s 'Extension Mine.' This Company have built a large addition to their coal bunkers for the storage of coal, and are making improvements of an extensive kind at their wharves to facilitate the loading of coal whereby the vessels may obtain quicker dispatch.

### "WELLINGTON COLLIERIES.

"These well-known collieries, the property of Messrs. R. Dunsmuir & Sons, are situated near the town of Wellington, about six miles from Nanaimo. Departure Bay, the shipping point, is three miles distant. Here the Company have taken advantage of the fine water front to erect extensive and commodious wharves furnished with every modern facility for loading their vessels. In addition to an office at the mines, this Company have also an office at San Francisco, but the head offices are at Victoria.

#### "No. 1 PIT (WELLINGTON).

"This pit is situated at a point about one mile from Departure Bay, and close to the eastern boundary of their estate, and here the Company have done a great deal of prospecting and rock tunnelling with, during the past two years, a large out-put of coal and fire clay of a very superior quality. All of the mining now done on this pit is from a slope, as mentioned in a former Report. They are down close to their southern boundary, with levels from the same to the west. The coal here is good in quality, and is worked on the 'long wall' system, which seems to be the safest way of mining this coal, especially where they are troubled with a soft roof.

#### "VENTILATION.

"The ventilation is good. When I was down in December there were 24,000 cubic feet of air passing per minute through the level, and 12,000 feet of this amount were going down the slope where 61 men and boys were at work. The air travels in through the level to the face, and returns by the face of the long wall, thence out to the up-cast, which is No. 1 shaft. Again, another 12,000 feet of the air supplied go out by the side slope in the No. 5 shaft at the fan shaft there.

#### "No. 3 PIT (WELLINGTON).

"This mine is in connection with No. 4 Pit. No work has been done in this pit during the past year, with the exception of the pumping of water. A large area of pillar coal remains to be gotten out of this mine.

#### "No. 4 PIT (WELLINGTON).

"This valuable mine has given the management much trouble through fires, which necessitated the filling of the mine with water on two occasions, and the flooding of the lower district a third time. All of the coal mining in this pit is now confined to the taking out of the pillars, of which a large number still remain, and which will give employment to a large number of men for some time to come.

#### "VENTILATION.

"This is good, the motive power being a large fan. In December I found 48,600 cubic feet of air passing per minute, for the use of 70 men and 20 mules, the mine being ventilated on the separate split system, with the division at the shaft bottom, and the air divided as follows :—

To the East side . . . . .	22,400 cubic feet per minute for 30 men.
" West " . . . . .	26,200 " 40 "

"This mine is connected with No. 3 Pit, and also with what is known as No. 4 fan shaft.

#### "No. 5 PIT (WELLINGTON).

"This pit has been, and is at the present time, not only the most extensive, but also the greatest coal-producing mine of the Wellington Collieries. Much of the coal mined in this pit is on the 'long wall' system, a considerable amount being derived from a section from which they are removing the pillars, but the district which is being mined on the 'pillar and stall' system is furnishing the largest amount. The total amount sent up from the latter section representing one-third of the total amount of coal area, two-thirds being left in the form of pillars for safety, to be removed at some future date. The coal in this district averages 8 feet in thickness, and it would be almost superfluous for me to write that it was good, as its quality is well known to the people of this coast. The area of coal still in sight justifies my saying that this mine will be a coal producer for some years to come.



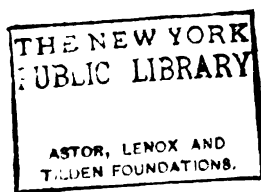


PROSPECTING GOLD-GRAVELS IN ROSE'S GULCH, QUESNELLE FORKS.



SIX INCH MONITOR IN CARIBOO MINE, NEAR QUESNELLE FORKS.





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 " VENTILATION.

"The ventilation is good, though after firing of shots there is a considerable amount of powder smoke, which soon passes away. When down in December, there were 75,500 cubic feet of air passing per minute for the use of 170 men and 26 mules. This mine is ventilated on the separate split system, in four divisions, as follows:—

To East side . . . . .	17,000	cubic feet of air for 31 men and 5 mules.
" West side . . . . .	7,400	" " 23 men and boys and 2 mules.
" Side slope . . . . .	15,200	" " 53 " " 9 "
" Incline . . . . .	35,900	" " 63 " " 10 "

"You will observe the large amount of air that is furnished to the east side, taking into account the number of men that are at work there. On this side all of the coal is got from the pillars, and in some of the places only locked safety lamps are allowed to be used. It is seldom that any gas is found there, but the lamps are used as a precaution, the old workings being close at hand and inaccessible, and not knowing what may be there, the safety lamps are used. No black powder is used in the foregoing places for the same reason. This mine is free from dust. In addition to the manager, this mine has a large staff of firemen (or assistants), who make a careful examination of the workings in every detail, and any serious change in the ventilation would thus be detected at once.

## "No. 6 PIT (WELLINGTON).

"This is another of the group of mines owned by this company. In this pit coal was originally mined on the pillar and stall system, and in that manner worked to the boundary. The company have now been working back, taking out the pillars as they recede. In course of time these will all be taken out, in addition to the boundary wall between this pit and the old East Wellington mine, which contains a considerable area of coal. In several places along the wall of this boundary the mining has been pushed so far that the drill has occasionally connected both mines.

## " VENTILATION.

"In December there were 42,600 feet of air registered on the intake, and on the return, near the upcast, 44,500 cubic feet of air were passing per minute for the use of 58 men and 5 mules. The two registers, therefore, show a loss in expansion of 1,900 feet. This mine is ventilated on the separate split system, as follows:—

To West heading . .	5,700	cubic feet per min.	No men working here.
" " level . . . . .	3,800	" " "	for 2 men.
" Dip . . . . .	4,900	" " "	" 14 " and 1 mule.
" East incline . . .	10,200	" " "	" 12 " " 1 "
" " level . . . . .	6,700	" " "	" 6 " " 1 "
" Jolly's level . . .	7,200	" " "	" 14 " " 1 "
" South level . . .	4,100	" " "	" 10 " " 1 "

"There are yet 1,900 cubic feet of air to be accounted for in loss and expansion. The above is the average during the year.

## " ALEXANDRIA MINE.

"This mine is also the property of Messrs. R. Dunsmuir & Sons, and lying to the south of the New Vancouver Coal Company's Southfield, is entered by a slope from the surface. The slope was driven about 18 years ago, for a distance of 800 yards, when the work was abandoned. In 1896, work was resumed by driving a tunnel off the slope in a northerly direction, likewise for a distance of 800 yards. The greater part of this distance was in good coal, at times not very thick, and at other times the coal reached above the roof. For hauling the loaded cars out of the mine, a large double engine has been erected. A switch and a siding, the greater part of which has been double tracked, have been put in from the E. & N. R. R., to enable the company to carry off their coal, either to Wellington or Victoria, for shipment or sale. In this mine at the present writing, there are 30 men at work. The out-put is about 120 tons per day, all of which is carried away on the E. & N. R. R.

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"VENTILATION.

"The ventilation is good. The means used to produce a current is a furnace, which is placed at the up-cast, a short distance down the slope. In December, there were 10,780 cubic feet of air passing per minute for 30 men as above mentioned. The coal taken from this mine makes very fine coke. There have been some hundreds of tons taken from here to the Union coke ovens, where it has been converted into coke of a good marketable kind. It is possible that in the near future, we may see coke ovens built in this vicinity.

"THE WELLINGTON COLLIERY COMPANY'S MINES.

"This mine is situated on the south slope of Mount Benson. There are two slopes in this mine. No. 1, where there has been very little work done during the past year, was run down for the purpose of prospecting to a distance of 700 yards and along the whole course of the drift, it was in good coal, from 6 to 11 feet thick. The management being satisfied with the prospects of No. 1, turned their attention to driving another slope, at a distance of two miles, in a south-easterly direction at the out-crop. Here, where the coal was 15 feet thick, they drove a slope down 400 yards with a counter slope as return airway. This slope is taken out at an uniform height of 8 feet, leaving a coal roof above. Here and there in the roof, a drill hole has been put in, to ascertain the thickness of the coal still remaining above them, and some of these holes have been driven in 6 feet without touching the proper roof. In the whole length the rock has been only exposed once. From what I have seen, this Douglas District will be the coal producing centre of Vancouver Island for the next generation. Near the entrance of this slope is a large double steam engine as well as an air compressor. The Company further contemplate driving a tunnel in at a lower level so as to tap this great coal basin. This tunnel will be a mile long, and will be the main opening of this field. The Company have also sunk five bore-holes, to ascertain the extent of the coal area, and there are yet some more to be put in.

"WEST WELLINGTON COLLIERY.

"This prospect is situated west of the Wellington Colliery, and is owned by the West Wellington Coal Company, Limited.

"But little mining has been done here during the past year. Some good coal was taken out, but not having the facilities to carry it to market the mine was stopped. This Company has bonded the rights of a large estate near Nanoose Bay, and on this they are now putting down a prospect hole with a diamond drill. We may yet see a large colliery in operation in this district under the control of this Company.

"UNION COLLIERY (COMOX).

"This colliery is the property of the Union Colliery Co., and is situated at the extreme end of the farming district of Comox. The mines and the farming settlement are connected by means of a good road which enables the farmers to find a market for their produce among those who work at the colliery.

"No 2 SLOPE.

"I have already stated in a former report that this slope was down 700 yards, and at the time of the then writing was standing idle from a slackness in the coal trade. It is a pleasure to state that, the trade having improved, work is now being carried on. The system of mining carried on here has been on the pillar and stall, and here, as in all the other mines of this district, the pillars constitute fully two-thirds of the original area of coal. In addition to still pushing the pillar and stall, many of the first pillars left standing are being taken out, which are producing first-class coal.

"VENTILATION.

"This is good. Motive power, a Guibal fan. When I last tested the air current there were 21,000 cubic feet of air passing per minute for the use of 53 men, who at that time were employed there. The mine is in good order, having a strong roof.

"No. 4 SLOPE (UNION).

"This is the most extensive mine in the Union Colliery. I have already mentioned in a former report, that this slope was down 2,400 yards, and no extension of it has been made

during the past year. The No. 2 (diagonal) slope has, however, been driven down quite a distance, all in good coal and on the true dip, so that the pitch is much greater, although the distance travelled to reach the same vertical depth is shorter. From the main slope there are four levels to the west side, known as Nos. 10, 11, 12 & 13, west levels. There are also three levels to the east side, but with the exception of one they are all cut by the diagonal slope, so that they now form part of the diagonal district. The coal in this mine is generally hard and of good quality.

#### " VENTILATION.

"The ventilation is good. An observation taken by me in December, showed that there were 45,000 cubic feet of air passing per minute for 198 men and 15 mules.

"This mine is ventilated on the separate split system, the first split being near the entrance of the mine, where the No. 2 or diagonal slope branches off No. 4 slope, part going down the diagonal, and part going down the No. 4 or main slope. At this split I found there were 22,000 cubic feet of air going down the main slope. When near the bottom the air is again split, 10,000 feet of it going into what is known as the No. 1 division, which is on the west side, to supply 58 men and 4 mules at work there. Through the No. 2 division which goes to the east side, there were 8,000 cubic feet of air passing for the demands of 38 men and 3 mules. Returning to the point where the first split occurred, which is at the junction of the No. 2 and the No. 4 slopes, my observation gave 24,600 cubic feet of air per minute, as passing down the No. 2 (or diagonal) slope. This current is again split near the bottom to the east and west sides of the slope, which are known as the No. 3 and No. 4 divisions. To the No. 3 or west side district, there were 12,000 cubic feet of air passing per minute, for the use of 59 men and 5 mules. To the No. 4 or east side district, there were 10,000 cubic feet of air passing for 43 men and 3 mules—there were, therefore, 5,000 feet to be accounted for; this quantity was escaping at the doors at the different levels of the slopes, but it is not lost, as it is caught on the level where it escapes, and conducted into the face, it also serves to keep the road of the level clear of foul air. This mine is free from dust. All the appliances and arrangements both in and about this mine, are on the most improved system for the saving of labour in the handling of coal.

#### " No. 5 SHAFT (UNION).

"This shaft and its machinery have been fully described in a former Report.

"In this pit the Company have been much troubled with faults of one kind and another. In some cases there has been an 'upthrow' of the coal; at another time the coal has either been wanting, or it has been a 'downthrow,' and again, sometimes the trouble has been in the presence of soft shale in the centre of the seam. But with all of these drawbacks, they manage to get out quite a large quantity of first-class coal. All of the mining at present done here is to the south of the shaft, and is on the 'long wall' system, for which the mine is well adapted, as after it is opened out the weight of the roof presses it over the face of the coal, making it almost loose, and thereby requiring but little powder.

#### " VENTILATION.

"The ventilation is good, the motive power being a Guibal fan. In the examination of the air current last December, there were 40,000 cubic feet of air passing round the mine per minute, for the use of 48 men and 3 mules. The ventilation is here likewise on the separate split system, the first division being at the foot of the shaft, to the east and west sides. To the east, 17,000 cubic feet per minute for 35 men and 3 mules; to the west, on the westward side of the shaft, 21,000 cubic feet per minute for 13 men. The mining being on the long-wall system, the air has a clean sweep along the whole face of the workings. In addition to the above amount of air, there are 2,000 feet of it which escape at the doors, and which again supply any person in the roads with fresh air. Before leaving this mine, I might mention that there is, as yet, but one outlet by which the men working within the mine can get out. I respectfully refer you to my former Report for further details. In the area of the surface of this mine a series of drill holes have been put down to various depths (from 600 to 1,000 ft.) to ascertain whether there was sufficient coal to justify them in sinking a shaft for a connection or an outlet to No. 5.

"The manager of this extensive work has now determined upon putting down another shaft, and with this in view they are working below ground towards a point which will be close to the shaft when sunk. As the wet season came on before their boring operations were

finished, the sinking of the shaft has been deferred to as early a period as possible in the spring. Under the above conditions, the manager applied for a permit under section 28, sub-section 2, paragraph (a) of the 'Coal Mines Regulation Act' to employ 40 men in addition to those mentioned in section 28, sub-section 1. The permit was granted on the conditions above mentioned.

"In addition to the extensive prospecting done in and about this colliery by the Union Colliery Co., some extensive works have been built near the shipping wharf. A 'Luhrig' washer and 'breakers,' to grind up the coal required for the coke ovens, have been erected. I mentioned in my last Report that this Company had erected 100 ovens for the manufacture of coke, from which the coal from the Union Colliery is well adapted. The above-mentioned ovens did not come up to expectations, so they were taken down and rebuilt during the past summer. These are now all at work, making a first-class coke, which commands a ready sale, both in this Province and in California, where it is also being used. Finding that the first outlay has been justified by the demand and sale of the product, the Company are now erecting 100 more ovens, which, if the weather proves favourable, will be ready in the spring. The fire-bricks and blocks used in the building of these ovens have been made from fire-clay mined in the Union Colliery. The transforming from clay to brick is effected in Victoria, to which point the clay is shipped and there made into the shapes required. Close to the ovens have been erected some large bunkers to receive the fine coal as it comes from the 'breakers' and washer. In these bunkers there is constantly on hand to supply the coke ovens, a large stock of coal, in case of any temporary stoppage of the washer. Bunkers, having a capacity of 4,000 tons, have also been erected near the shipping wharves for the storage of coal when there are no ships at the wharf to take it in."

#### THE CROW'S NEST PASS COAL COMPANY, LIMITED.

This Company takes its name from the pass in the Rocky Mountains where the Canadian Pacific Railroad Company is now building the second railway of the Company from Alberta into British Columbia.

The Crow's Nest Pass Coal Company is now opening out coal mines to the north and south sides of Coal Creek, in Crow's Nest Pass, and about 35 feet above the level of the grade for the railways.

On the north side of the above-named creek they have what is known as No. 1 tunnel. This is now in 190 feet, and 30 of this is in what is termed the 6-foot seam. This coal is hard and clean; what they have tried makes a good hard coke.

On the south side of Coal Creek they have what is called No. 2 tunnel, now in 220 feet, in coal all the distance. This seam is 7 feet thick, and is termed the Jaffray seam. This is softer than the coal mined in No. 1 tunnel. In addition to its coking qualities, it is good for blacksmith purposes. The coal now being worked in No 2 tunnel is 40 feet above (overlying) that worked in No. 1.

In the above works there are now 20 men employed.

#### "ACCIDENTS

"IN AND ABOUT THE COAL MINES OF BRITISH COLUMBIA FOR THE YEAR ENDING THE 31ST DAY OF DECEMBER, 1897.

- |          |   |
|----------|---|
| January  | 21—Daniel Martin, runner in Protection shaft, was severely injured about the head and body by a loaded car in the mine.   |
| February | 6—John Thomson, overman, and Edward Austin, timberman, of No. 5 pit, Union Colliery, were burned about the face and hands in the 'Old Workings' by an explosion of gas. |
| "        | 6—Ah Chung, labourer in No. 5 shaft, Union Colliery, had his arm broken while at work.  |
| "        | 12—Edward Berry and John Hoggan, miners, working in No. 4 pit, Wellington Colliery, were slightly injured by a fall of coal while at work.                              |
| "        | 23—Robert Jones, miner, got his shoulder dislocated and also received other slight injuries by a fall of rock while at work in No. 1 shaft, Wellington Colliery.        |
| March    | 18—Samuel Jones, mule driver, in No. 4 pit, Wellington Colliery, got his leg broken by a mule falling on him.   |

March	27—James Lewis, miner, working in No. 4 slope, Union Colliery, got the small bone (fibula) of his leg broken by a stringer falling on him while in the act of setting it up.
April	27—Albert Taylor, miner, working in No. 1 shaft, Nanaimo Colliery, was slightly burned about the neck and hands by an explosion of gas.
June	2—Henry Rosewall, miner, while at work in his stall in Protection shaft, Nanaimo Colliery, had one leg broken by a fall of coal.
"	2—Wm. Jones, runner, in Protection shaft, was severely bruised about the legs by getting jammed by a loaded car in the mine.
"	10—J. E. Calman, miner, working in No. 4 slope, Union Colliery, was hurt by a piece of rock falling on him while at work.
"	12—A. Protery, miner, working in No. 4 slope, Union Colliery, was slightly hurt by a piece of rock falling on him while at work.
"	16—Charles Paul, runner in Protection Shaft, Nanaimo Colliery, was killed by a fall of rock from the roof of a stall.
"	16—Mah Soot, loader, and working in No. 4 slope, Union Colliery, had his leg broken by a stringer falling on him.
"	18—Matthew Cottle, miner in Protection shaft, Nanaimo Colliery, was hurt about the back by a fall of rock.
July	29—James Kendall had his leg broken by falling from the elevator tower at No. 4 slope, Union Colliery.
August	7—James Glen, miner in No. 4 pit, Wellington Colliery, got his arm broken by a mine car.
"	9—Ah Lun, labourer, who had been directed to keep on the travelling road, but who persisted in walking between the rails, was killed by the cars in No. 4 slope, Union Colliery.
September	13—Robert Galloway, miner, working in the Alexandria Mine, was hurt about the back by a fall of coal.
"	27—J. Taniguchie, labourer in No. 4 slope, Union Colliery, was killed on the slope, being overtaken by the cars while trying to re-light his lamp.
October	22—William Challoner, miner, while at work in No. 1 shaft, Nanaimo Colliery, sustained a fracture of the collar bone by the falling of a piece of coal.
"	25—Thomas Myles, miner in No. 1 shaft, Nanaimo Colliery, was severely injured about the back and the lower part of the body by a fall of coal from the face.
October	28—Jap, a labourer, in No. 4 slope, Union Colliery, was burned about the face and arms by an explosion of gas.
November	13—Robert Potts, miner, working in No. 5 shaft, Nanaimo Colliery, was severely injured about the body by a fall of rock while at work.
"	19—Robert Potts died to-day.
"	23—N. Boyde, miner, working in the Alexandria Mine, had his face badly cut by fall of rock.
"	26—Jacob Haapal, miner, working in No. 1 shaft, Nanaimo Colliery, sustained a dislocation of his knee joint by the cage landing too heavily on the bottom of the shaft, causing him to fall and twist his leg.
"	30—John Benaski, mule driver in No. 4 pit, Wellington Colliery, got his back injured by being jammed between a box and a stringer.
December	1—Andrew Stewart, mule driver in No. 6 pit, Wellington Colliery, was killed by a fall of coal while at work.
"	3—William Palmer, mule driver in No. 5 pit, Wellington Colliery, got his foot broken by the fall of a piece of rock.
"	17—Andrew Dumont, miner, working in No. 6 pit, Wellington Colliery, got his foot injured by a fall of rock from the roof.
"	29—Roland James, rope runner in No. 4 slope, Union Colliery, was seriously injured by falling under the empty cars, and died in the evening of the same day.

"Once more I must express regret at the close of another year that I have to make out the foregoing long list of accidents, both fatal and otherwise. Although there is a marked decrease in the number, still I must say that in my opinion there was a large number that might, with ordinary caution, have been avoided.

"In the list given you will observe that there are 33 accidents in all, six of these being fatal, and the balance reported as slight. Of the latter, five were from the falling of coal, nine from rock, four from explosions of gas, four from cars in the mines, one by a kick from a mule, two from stringers while in the act of setting them up, one from the cage in the shaft, and another by a fall from an elevator. Of the fatal accidents, one was caused by a fall of coal, two by the falling of rock, and three from the cars in the mines. In all of the accidents mentioned there were not more (except on two occasions) than one person injured at a time. I made inquiries on all occasions, as to the circumstances of and the causes of these accidents, as soon as possible after the receipt of notice from the manager. On many occasions I have been on the spot before receiving the notice. With one exception, all of the accidents mentioned happened while the injured parties were at work. In the case of fatal accidents, an inquest was invariably held, and the evidence and inquisition filed with the Attorney-General's Department, for the information of the Government.

"I can only repeat here what I have mentioned in previous reports, that in addition to the workman himself who is supposed to use ordinary care and precautions for his own safety, there is in all of the collieries a large staff of assistants employed to look after the safety of those working below. For instance: There are the manager, overman, fireman, and shot examiner, and many others having authority, all of whom are constantly moving about the works, and throughout the mine. The fireman and shot examiners are always provided with safety lamps, for the purpose of examining any places which are likely or are suspected to contain gas, the most dreaded of all dangers to the coal miner. All of the old works which can be got at or visited are frequently examined, and more especially is this the case where they are taking out pillars. In this way the condition of the mine is constantly and accurately known, as to the prevalence or otherwise of gas.

"Once more have I to record that the miners of the Nanaimo Colliery are the only workmen who have as yet availed themselves of the privileges allowed them under General Rule 31, 'Coal Mines Regulation Act.' This privilege is the examination by committee of themselves of the mine and its condition as regards safety. The results of these examinations are posted up in a conspicuous place for the information of the men, and are also entered in a book kept for the purpose.

"Although there has been a decrease in the number of casualties and fatal accidents in the mines during the past year, there is still room for improvement, as many of the accidents have been preventable, under proper precautions; but we can only hope that the future will witness a satisfactory improvement in this regard.

"I append hereto the annual colliery returns for 1897."

### COLLIERY RETURNS.

#### NANAIMO COLLIERY RETURNS FOR 1897.

Output of coal for 12 months ending December 31st, 1897.		No. of tons sold for home consumption.		No. of tons sold for exportation.		No. of tons on hand 1st January, 1897.		No. of tons unsold, including coal in stock, Jan. 1st, 1898.	
Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
319,343	14	85,683	17	231,986	10	3,067	4	4,720	11

Number of hands employed.				Wages per day.			
Whites.	Boys.	Indians.	Chinese.	Whites.	Boys.	Indians.	Chinese.
641	44	.....	111	\$2.37 to \$3.50	\$1 to \$2	.....	\$1 to \$1.25
Total hands employed .....				Miners' earnings, per day .....			
796				\$2.75 to \$4.50.			

Name of Seams or Pits—Southfield No. 2, Southfield No. 5, No. 1 Esplanade Shaft, No. 1 Northfield Shaft, Protection Island Shaft.

Value of Plant—\$350,000.

Description of seams, tunnels, levels, shafts, &c., and number of same—Southfield No. 2, worked by slope, seam 6 to 10 feet; Southfield No. 5, worked by shaft, seam 5 to 10 feet; No. 1 Northfield Shaft, worked by shaft, seam 2 feet to 3 feet 6 inches; Protection Island Shaft, worked by shaft, lower seam 4 feet, upper seam 6 feet; No. 1 Esplanade Shaft, worked by shaft, seam 5 to 12 feet.

Description and length of tramway, plant, &c.—Railway to Southfield, 6 miles, with sidings; railway to No. 1 Shaft, 1 mile, with sidings; railway from Northfield Mine to wharf at Departure Bay,  $4\frac{1}{2}$  miles; rails are of steel, 56 lbs. per yard, of standard gauge, viz., 4 feet  $8\frac{1}{2}$  inches; 8 hauling and pumping engines, 15 steam pumps, 5 locomotives, 238 coal cars (6 tons), besides lumber and ballast cars; bunkers with a capacity of 4,700 tons; fitting shops for machinery repairs, with turning lathes, boring, drilling, planing, screw-cutting machines, hydraulic press, steam hammer, &c., &c.; diamond boring machinery for exploratory work (bores to 4,000 feet); 150 horse-power electric plant engines, boilers, dynamo; 4 30 horse-power 8-ton locomotives, and 1 15 horse-power locomotive; hauling and lighting equipment; wharves, 2,000 feet frontage, at which ships of the largest tonnage can load at all stages of the tide.

SAMUEL M. ROBINS,  
*Superintendent.*

#### WELLINGTON COLLIERY RETURNS FOR 1897.

Output of coal for 12 months ending December 31st, 1897.		No. of tons sold for home consumption.		No. of tons sold for exportation.		No. of tons on hand 1st January, 1897.		No. of tons unsold, including coal in stock, Jan. 1st, 1898.	
Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
297,611	15	91,246	3	211,662	5	14,634	9	9,337	16

Number of hands employed.				Wages per day.			
Whites.	Boys.	Japanese.	Chinese.	Whites.	Boys.	Japanese.	Chinese.
631	75	8	83	\$2.25 to \$3.50	\$1 to \$2	\$1 to \$1.50	\$1 to \$1.50
Total hands employed ..... 797				Miners' earnings, per day ..... \$2.50 to \$3.50.			

Name of Seams or Pits—1, 3, 4, 5, and 6 Wellington, and 1 and 2 East Wellington.

Value of Plant—\$150,000.

Description of seams, tunnels, levels, shafts, &c., and number of same—7 shafts, with slopes, airways, and levels; 3 air shafts.

Description and length of tramway, plant, &c.—5 miles of railway, with sidings and branches; 6 locomotives; 250 coal cars; 13 stationary engines; 9 steam pumps; 4 wharves for loading vessels, and bunkers.

Output of fire-clay— $405\frac{1}{2}$  tons; sold,  $405\frac{1}{2}$  tons.

R. DUNSMUIR & SONS.



## UNION COLLIERY RETURNS FOR 1897.

Output of coal for 12 months ending December 31st, 1897.		No. of tons sold for home consumption.		No. of tons sold for exportation.		No. of tons on hand 1st January, 1897.		No. of tons unsold, including coal in stock, Jan. 1st, 1898.	
Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
265,642	—	98,697	—	176,212	—	14,410	—	5,153	—
Number of hands employed.					Wages per day.				
Whites.	Boys.	Japanese.	Chinese.	Whites.	Boys.	Japanese.	Chinese.		
425	32	72	225	\$2.25 to \$3.50	\$1.25 to \$1.50	\$1 to \$1.25	\$1 to \$1.50		
Total hands employed .....				754	Miners' earnings, per day .....		\$2.50 to \$4.50.		

Name of Seams or Pits—Comox. Value of Plant—\$125,000.

Description of seams, tunnels, levels, shafts, &c., and number of same—No. 2 Slope; No. 4 Slope, with airway and levels; No. 5 Shaft, with airway and levels.

Description and length of tramway, plant, &c.—12 miles railway, 4 feet 8½ inches gauge; 4 locomotives; 150 coal cars (25 tons each); 1 second-class passenger car; 1 combination passenger car; 1 diamond drill; 4 stationary engines; 5 steam pumps; 5 electric pumps; 1 dynamo; 1 steam saw-mill; 1 Luhrig coal washer; 100 coke ovens (Beehive pattern); 2 wharves; 1 pile-driver.

No. of tons of coke sold—17,101½. Coke on hand—730 tons.

" " fire-clay sold—1,223.

JAMES DUNSMUIR, *President*.

## WELLINGTON COLLIERY RETURNS FOR 1897.

Output of coal for 12 months ending December 31st, 1897.		No. of tons sold for home consumption.		No. of tons sold for exportation.		No. of tons on hand 1st January, 1897.		No. of tons unsold, including coal in stock, Jan. 1st, 1898.		
Tons. 6,000	cwt. —	Tons. —	cwt. —	Tons. —	cwt. —	Tons. 4,000	cwt. —	Tons. 10,000	cwt. —	
Number of hands employed.				Wages per day.						
Whites.	Boys.	Indians.	Chinese.	Whites.	Boys.	Indians.	Chinese.			
15	.....	.....	6	\$2 to \$3	.....	.....	\$1 to \$1.25			
Total hands employed .....				21		Miners' earnings, per day .....				\$3 to \$4.

Name of Seams or Pits—Wellington.

Value of Plant—\$1,000.

Description of seams, tunnels, levels, shafts, etc., and number of same—Nos. 1 and 2 slopes, with airways.

Description and length of tramway, plant, etc.—1 boiler and hoisting engine.

JAMES DUNSMUIR,  
*President*.

## ALEXANDRIA COLLIERY RETURNS FOR 1897.

Output of coal for 12 months ending December 31st, 1897.		No. of tons sold for home consumption.		No. of tons sold for exportation.		No. of tons on hand 1st January, 1897.		No. of tons unsold, including coal in stock, Jan. 1st, 1898.	
Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
3,375	—	14,375	—	—	—	12,000	—	1,000	—
Number of hands employed.				Wages per day.					
Whites.	Boys.	Indians.	Chinese.	Whites.	Boys.	Indians.	Chinese.		
27	.....	.....	10	\$2 to \$3	.....	.....	\$1 to \$1.25		
Total hands employed .....				37	Miners' earnings, per day .....				\$3 to \$4.

Name of Seams or Pits—Alexandria.

Value of Plant—\$2,000.

Description of seams, tunnels, levels, shafts, etc., and number of same—No. 1 slope, with air-way and levels.

Description and length of tramway, plant, etc.—Boilers and hoisting engines.

JAMES DUNSMUIR,

*Vice-President.*

## WEST WELLINGTON COLLIERY RETURNS FOR 1897.

Output of coal for 12 months ending December 31st, 1897.		No. of tons sold for home consumption.		No. of tons sold for exportation.		No. of tons on hand 1st January, 1897.		No. of tons unsold, including coal in stock, Jan. 1st, 1898.	
Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
323	10	317	10	—	—	—	—	6	—
Number of hands employed.				Wages per day.					
Whites.	Boys.	Indians.	Chinese.	Whites.	Boys.	Indians.	Chinese.		
8	.....	.....	.....	\$2.50	.....	.....	.....		
Total hands employed .....				8	Miners' earnings, per day .....				\$2.50

Name of Seams or Pits—West Wellington.

Value of Plant—About \$2,000.

Description of seams, tunnels, levels, shafts, etc., and number of same—One slope; seam, from 5 to 6 feet thick; 2 levels; no shaft.

Description and length of tramway, plant, etc.—Wooden tramway, 6½ miles long, to Nanoose Bay; 1 steam pump, hoisting engine, trucks, etc.

WEST WELLINGTON COAL CO., LTD. LY.,

WM. SULLY,

*Acting Secretary.*



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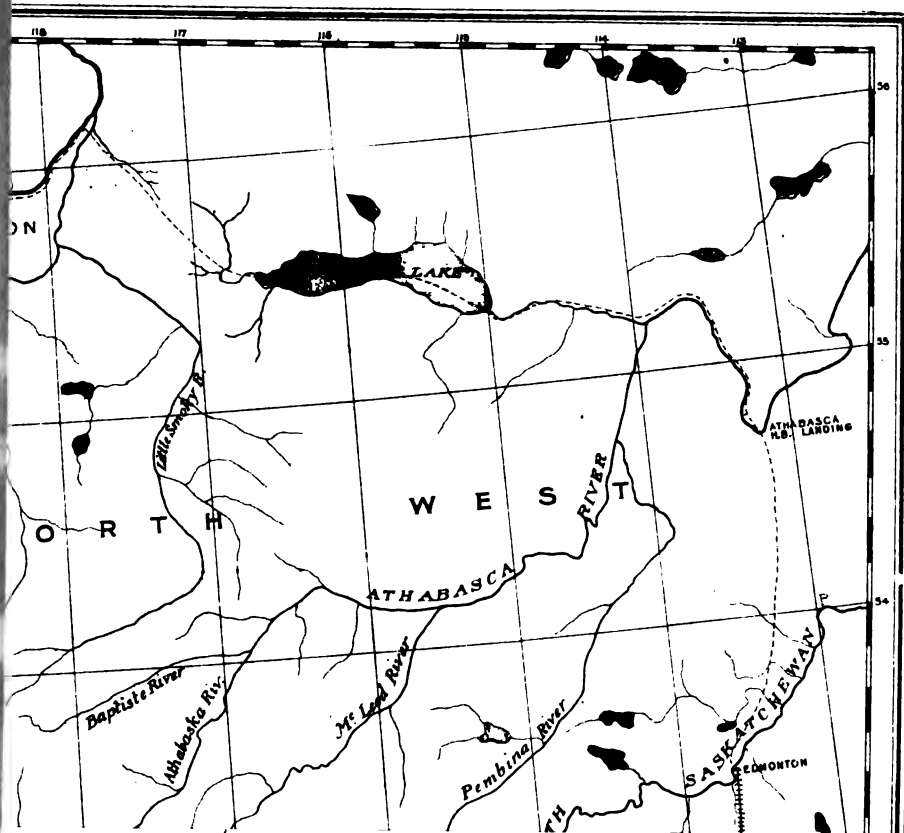
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VICTORIA, B. C. :

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ANNUAL REPORT  
OF THE  
MINISTER OF MINES  
FOR THE  
YEAR ENDING 31st DECEMBER,  
1898,

BEING AN ACCOUNT OF  
MINING OPERATIONS FOR GOLD, COAL, ETC.,  
IN THE  
PROVINCE OF BRITISH COLUMBIA.



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VICTORIA, B. C. :  
Printed by RICHARD WOLFENDEN, Printer to the Queen's Most Excellent Majesty.  
1899.

PRICE FIFTY CENTS.



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REPORT  
OF THE  
MINISTER OF MINES,  
1898.

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o

*To His Honour* THOMAS R. McINNES,  
*Lieutenant-Governor of the Province of British Columbia.*

MAY IT PLEASE YOUR HONOUR:

The Annual Report of the Mining Industries of the Province for the year 1898  
is herewith respectfully submitted.

J. FRED HUME,  
*Minister of Mines.*

*Minister of Mines' Office,*  
*23rd February, 1899.*



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# REPORTS

—BY—

WILLIAM FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

---

*To the Hon. J. Fred Hume,  
Minister of Mines.*

SIR,—I have the honour to submit herewith the following statistical tables showing the mineral production of British Columbia for the year ending December 31st, 1898, and illustrating, by comparisons with past years, the progress in mining during the year.

I also submit detailed Reports upon the various Mining Divisions of the Province. In gathering the material for the statistics I have been met by a ready compliance with the requirements of the "Inspection of Metalliferous Mines Act, 1897," and have received, in every instance, the detailed statement as to production therein provided for—based on smelter or mill returns.

I believe the returns to be correct, and I think they will be found to be practically complete.

In the compilation of this, my first report as Provincial Mineralogist, I have adhered, as closely as possible, to the general form established by my predecessor, Mr. Carlyle, making only such slight changes as may have been found necessary.

I have the honour to be,

Sir,

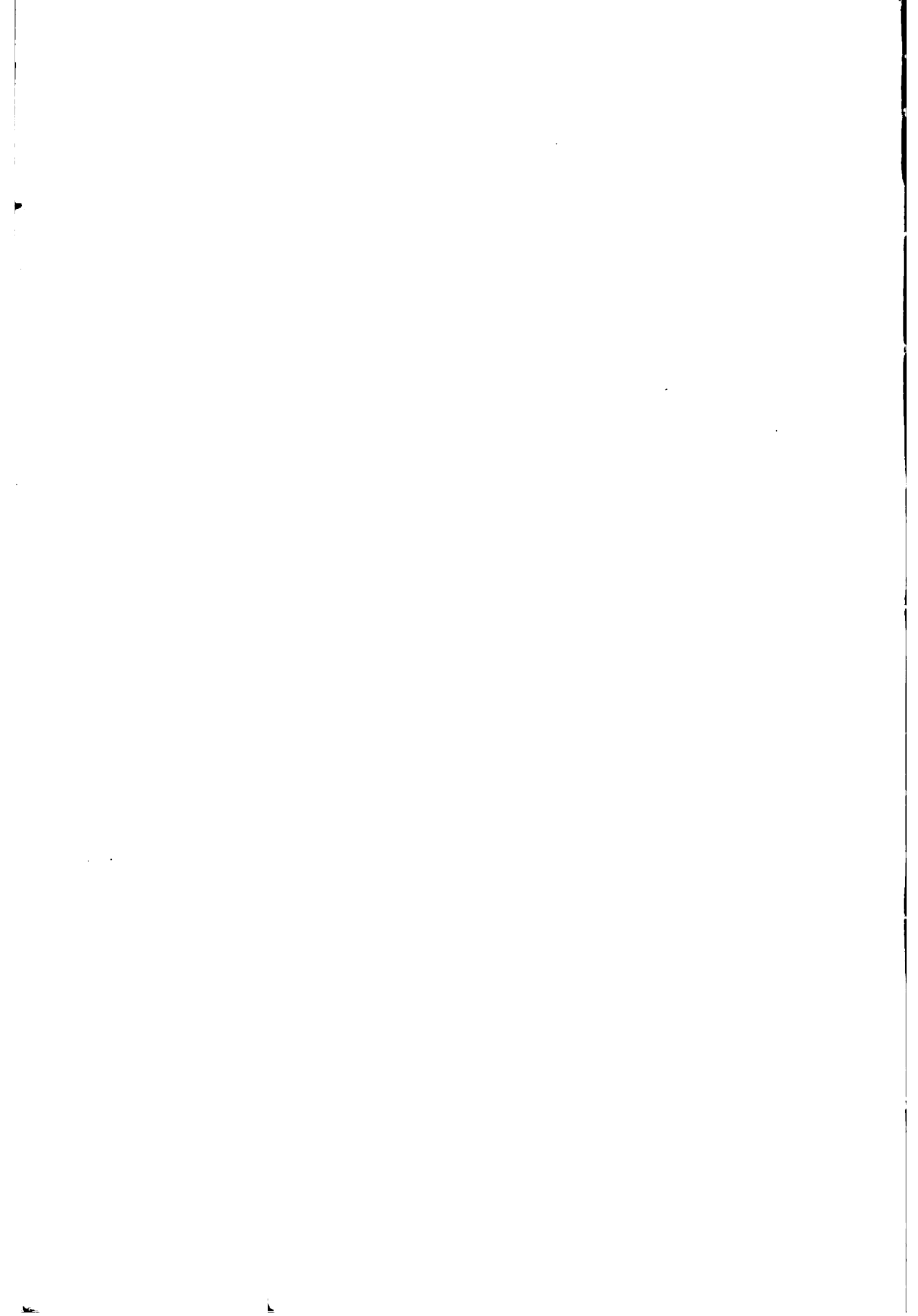
Your obedient Servant,

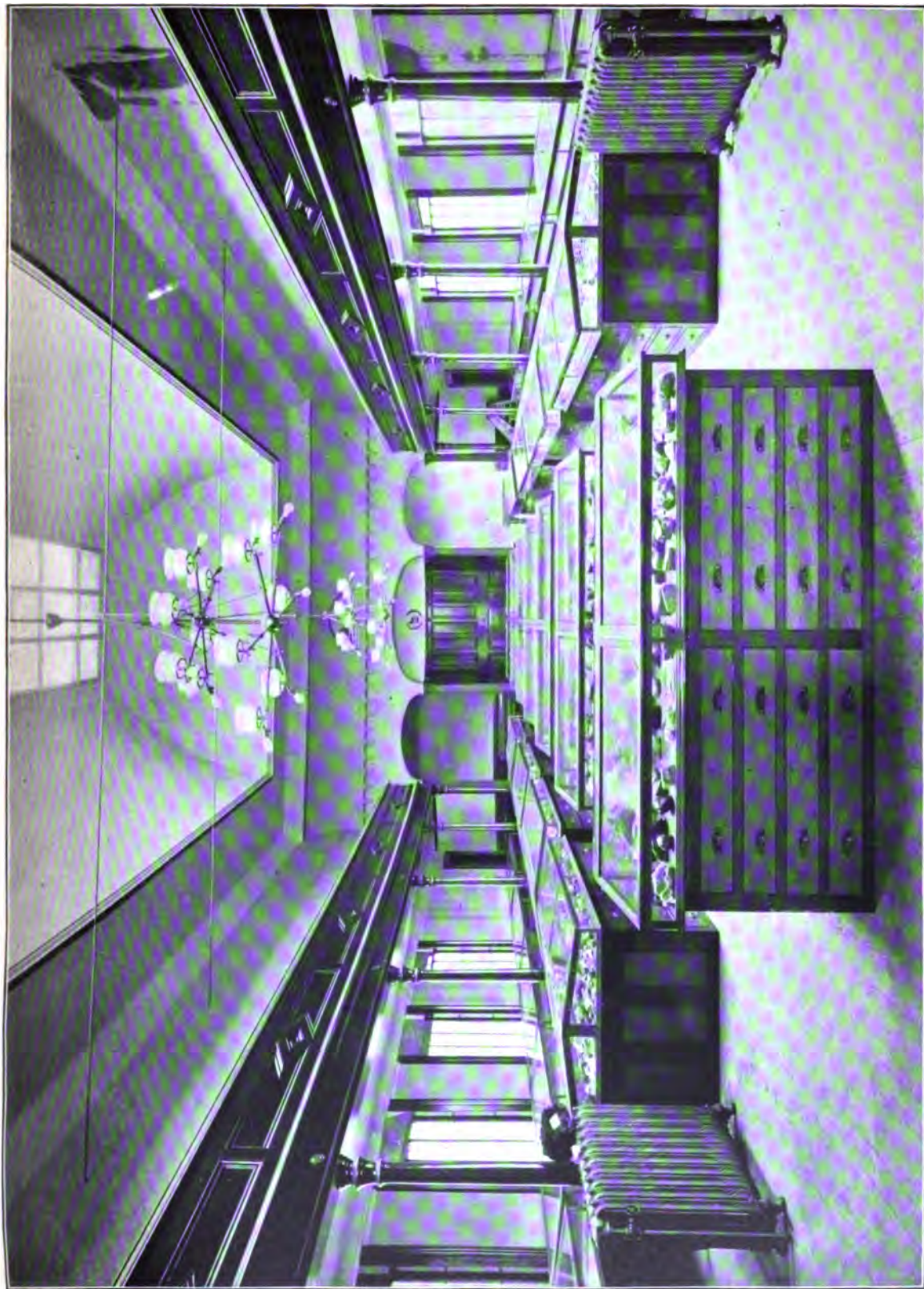
WILLIAM FLEET ROBERTSON,

*Provincial Mineralogist.*

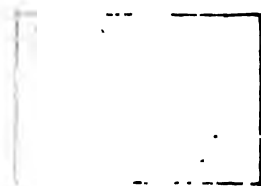
*Victoria, B. C. February 7th, 1899.*







ORE EXHIBIT, MAIN HALL, DEPARTMENT OF MINES MUSEUM.



## MINERAL PRODUCTION OF BRITISH COLUMBIA.

—:0:—

### METHOD OF COMPUTING PRODUCTION.

In assembling the out-put of the lode mines in the following tables, the established custom of this Department has been adhered to, viz: The out-put of a mine for the year has been considered that amount of ore for which the smelter or mill returns have been received during the year. This system does not give the exact output of the mine, but rather the amounts credited to the mine on the company's books during the year.

For ore shipped in December the smelter returns are not likely to be received until February, or later, of the new year, and have, consequently, to be carried over to the credit of such new year. This plan will be found very approximate, however, for each year, and ultimately correct, as ore not credited to one year is included in the next.

In the lode mines tables the amount of the shipments are obtained from certified returns received from the various mines, as provided for in the "Inspection of Metalliferous Mines Act, 1897." In calculating the values of the products the average price for the year of the New York Metal Market has been used as a basis in all cases. For silver 95 per cent. and for lead 90 per cent. of such market price has been taken. Treatment and other charges have not been deducted.

TABLE I.

TOTAL PRODUCTION FOR ALL YEARS UP TO AND INCLUDING 1898.

Gold, placer .....	\$ 59,960,819
Gold, lode .....	6,501,906
Silver .....	9,676,901
Lead .....	4,049,199
Copper .....	1,395,841
Coal and Coke .....	40,306,160
Building stone, bricks, etc .....	1,500,000
Other metals .....	26,500
Total .....	\$123,417,326

TABLE II.

PRODUCTION FOR EACH YEAR FROM 1890 TO 1898 (INCLUSIVE).

Year.	Amount.
1890 .....	\$ 2,608,803
1891 .....	3,521,102
1892 .....	2,978,530
1893 .....	3,588,413
1894 .....	4,225,717
1895 .....	5,643,042
1896 .....	7,507,956
1897 .....	10,455,268
1898 .....	10,906,861

Table III. gives a statement in detail of the amount and value of the different mineral products for the years 1896, 1897, and 1898. As it has yet been impossible to collect the statistics regarding building stone, lime, bricks, tiles, etc., these are estimated for 1897 and 1898, but not estimated for or included in the output for 1896.

TABLE III.

## AMOUNT AND VALUE OF MINERAL PRODUCTS FOR 1896, 1897, AND 1898.

	Customary Measure.	1896.		1897.		1898.	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Gold, placer.....	Ounces.....	27,201	\$ 544,026	25,676	\$ 513,520	32,167	\$ 643,346
" lode.....	".....	62,259	1,244,180	106,141	2,122,820	110,061	2,201,217
Silver.....	".....	3,135,343	2,100,689	5,472,971	3,272,836	4,292,401	2,375,841
Copper.....	Pounds.....	3,818,556	190,926	5,325,180	266,258	7,271,678	874,781
Lead.....	".....	24,199,977	721,384	38,841,135	1,390,517	31,693,559	1,077,581
Coal.....	Tons, 2,240 lbs	894,882	2,688,666	882,854	2,648,562	1,135,865	3,407,595
Coke.....	" "	615	3,075	17,832	89,155	35,000	175,000
Other materials.....	" "		15,000		151,600		151,500
			\$7,507,946		\$10,455,268		\$10,906,861

TABLE IV.

## PRODUCTION OF METALS BY DISTRICTS AND DIVISIONS.

NAME.	DIVISIONS.			DISTRICTS.		
	1896.	1897.	1898.	1896.	1897.	1898.
CARIBOO.....				\$ 384,050	\$ 325,000	\$ 389,360
Barkerville Division.....	\$ 82,900	\$ 65,000	\$ 94,500			
Lightning Creek ".....	53,000	25,000	37,000			
Quesnelmouth ".....	51,100	35,000	28,000			
Keithley Creek ".....	197,050	200,000	214,860			
CASSIAR.....				21,000	37,060	107,300
KOOTENAY, EAST.....				154,427	163,796	133,368
KOOTENAY, WEST.....				4,002,735	6,765,703	6,042,975
Ainsworth Division.....	345,626	440,545	159,801			
Nelson ".....	545,529	789,215	694,880			
Slocan ".....	1,854,011	3,280,686	2,619,852			
Trail Creek ".....	1,243,360	2,097,280	2,470,811			
Other parts.....	14,209	157,977	97,631			
LILLOOET.....				33,665	39,840	47,814
YALE.....				206,078	226,762	432,512
Osoyoos.....	131,220	142,982	364,112			
Similkameen.....	9,000	25,100	7,560			
Yale.....	65,108	58,680	60,840			
OTHER DISTRICTS.....				15,000	9,390	19,437
				\$4,816,955	\$7,567,551	\$7,172,766

## PLACER GOLD.

Table V. continues the yearly production of placer gold to date, as determined by the returns sent in by the banks and express companies of gold transmitted by them to the mints, and from returns sent in by the Gold Commissioners and Mining Recorders. To these yearly amounts, one-third was added up to the year 1878, from then to 1895 and for 1898, one-fifth, which proportions are considered to represent, approximately, the amount of gold sold of which there is no record. This placer gold contains from 10 to 25 per cent. silver, but the silver value has not been separated from the totals, as it would be insignificant.

TABLE V.

## YIELD OF PLACER GOLD PER YEAR TO DATE.

1858.....	\$ 705,000	1879.....	\$1,290,058
1859.....	1,615,070	1880.....	1,013,827
1860.....	2,228,543	1881.....	1,046,737
1861.....	2,666,118	1882.....	954,085
1862.....	2,656,903	1883.....	794,252
1863.....	3,913,563	1884.....	736,165
1864.....	3,735,850	1885.....	713,738
1865.....	3,491,205	1886.....	903,651
1866.....	2,662,106	1887.....	693,709
1867.....	2,480,868	1888.....	616,731
1868.....	3,372,972	1889.....	588,923
1869.....	1,774,978	1890.....	490,435
1870.....	1,336,956	1891.....	429,811
1871.....	1,799,440	1892.....	399,526
1872.....	1,610,972	1893.....	356,131
1873.....	1,305,749	1894.....	405,516
1874.....	1,844,618	1895.....	481,683
1875.....	2,474,004	1896.....	544,026
1876.....	1,786,648	1897.....	513,520
1877.....	1,608,182	1898.....	643,346
1878.....	1,275,204		
Total.....		\$59,960,819	

TABLE VI.

The information as to production in the earlier years is obtained from the "Mineral Statistics and Mines for 1896," Geological Survey of Canada.

## PRODUCTION OF LODE MINES.

YEAR.	GOLD.		SILVER.		LEAD.		COPPER.		TOTAL VALUES.
	Oz.	Value.	Oz.	Value.	Pounds.	Value.	Pounds.	Value.	
		\$		\$		\$		\$	\$
1887 .....			17,690	17,331	204,800	9,216			26,547
1888 .....			79,780	75,000	674,500	29,813			104,813
1889 .....			53,192	47,873	165,100	6,498			54,371
1890 .....			70,427	73,948	Nil.	Nil.			73,948
1891 .....			4,500	4,000	Nil.	Nil.			4,000
1892 .....			77,160	66,935	808,420	33,064			99,999
1893 .....	1,170	23,404	227,000	195,000	2,135,023	78,996			297,400
1894 .....	6,252	125,014	746,379	470,219	5,662,523	169,875	324,680	16,234	781,342
1895 .....	39,264	785,271	1,496,522	977,229	16,475,464	532,255	952,840	47,642	2,342,397
1896 .....	62,259	1,244,180	3,135,343	2,100,689	24,199,977	721,384	3,818,556	190,926	4,257,179
1897 .....	106,141	2,122,820	5,472,971	3,272,836	38,841,135	1,390,517	5,325,180	266,258	7,052,431
1898 .....	110,061	2,201,217	4,292,401	2,375,841	31,693,559	1,077,581	7,271,678	874,781	6,529,420
	325,147	\$6,501,906	15,673,365	\$9,676,901	120,860,501	\$4,049,199	17,692,934	\$1,395,841	\$21,623,847

TABLE VII.

## PRODUCTION IN DETAIL OF THE METALLIFEROUS

DISTRICT.	YEAR.	TONS.	GOLD—PLACER.		GOLD—LODE.		SILVER.	
			Ounces.	Value.	Ounces.	Value.	Ounces.	Value.
				\$		\$		\$
<b>CARIBOO</b>								
Barkerville Division	1886		4,145	82,900				
	1887		3,250	65,000				
	1888		4,725	94,500				
Lightning Creek "	1886		2,650	53,000				
	1887		1,250	25,000				
	1888		1,850	37,000				
Quesnelmouth "	1886		2,555	51,100				
	1887		1,750	35,000				
	1888		1,400	28,000				
Quesnel Forks, Keithley Ck. Division.	1886		9,853	197,050				
	1887		10,000	200,000				
	1888		10,743	214,860				
Omineca (Land Record'g Div.)	1886							
	1887							
	1888		750	15,000				
<b>CASSIAR</b>								
Atlin Lake Division	1886							
	1887							
	1888		3,750	75,000				
All other Divisions	1886		1,050	21,000				
	1887		1,853	37,060				
	1888		1,615	32,300				
<b>KOOTENAY, EAST</b>								
Fort Steele Division	1886		1,064	21,076			73,796	49,443
	1887	2,497	600	12,000			116,657	69,700
	1888	1,971	850	* 17,000			69,780	38,623
<b>KOOTENAY, WEST</b>								
Ainsworth Division	1886						374,097	250,065
	1887	5,556					524,578	313,697
	1888	1,738					167,147	92,515
Nelson "	1886	30,160	275	5,500	236	4,720	631,999	423,413
	1887	50,014			2,076	41,520	961,124	574,752
	1888	52,762			3,823	76,459	692,367	383,225
Slocan "	1886	16,560			152	3,040	1,954,258	1,309,353
	1887	33,567			193	3,860	3,641,287	2,177,490
	1888	30,691			60	1,194	3,068,648	1,698,496
Trail Creek "	1886	38,075			55,275	1,104,500	89,285	59,830
	1887	68,804			97,024	1,940,480	110,068	65,821
	1888	111,282			87,943	1,746,861	170,804	94,539
Others (Trout Lake, Revelstoke).	1886	58	231	4,627	35	700	11,917	7,965
	1887	1,781	300	6,000	9	180	116,657	69,761
	1888	621	552	11,040	346	6,923	121,510	67,256
LILLOOET	1886		1,683	33,665				
	1887	755	1,874	37,480	118	2,360		
	1888	900	2,130	42,614	260	5,200		
<b>YALE</b>								
Osoyoos, Kettle River, Grand Forks.	1886				6,561	131,220		
	1887	6,098	440	8,800	6,674	133,480	1,174	702
	1888	14,820	382	7,632	17,824	356,480		
† Similkameen "	1886		450	9,000				
	1887		1,175	23,500				
	1888		378	7,560				
Yale "	1886		3,255	65,108				
	1887		2,934	58,680				
	1888		3,042	60,840				
OTHER DISTRICTS	1886	290	250	5,000	47	940	1,426	853
	1887							
	1888	1,159			405	8,100	2,145	1,187
Building stone, bricks, etc.	1886							
	1887							
	1888							
TOTALS	1886		27,201	\$544,026	62,259	\$1,244,180	3,135,343	\$2,100,689
	1887	169,362	25,676	\$513,520	106,141	\$2,122,820	5,472,971	\$3,272,836
	1888	215,944	32,167	\$643,346	110,061	\$2,201,217	4,292,401	\$2,375,841

\* Estimated.

† 100 ounces Platinum in 1898 = \$1,500.

## MINES FOR 1896, 1897, AND 1898.

COPPER.		LEAD.		TOTALS FOR DIVISIONS.			TOTALS FOR DISTRICTS.		
Pounds.	Value.	Pounds.	Value.	1896.	1897.	1898.	1896.	1897.	1898.
	\$		\$	\$	\$	\$	\$	\$	\$
							384,050	325,000	389,360
				82,900	65,000	94,500			
				53,000	25,000	37,000			
				51,100	35,000	23,000			
				197,050	200,000	214,860			
						15,000			
							21,000	37,000	107,300
						75,000			
				21,000	37,000	32,900			
							154,427	163,796	133,368
		2,808,411	83,908	154,427					
		2,291,451	82,036		163,796				
		2,286,603	77,745			133,368			
							4,002,735	6,765,703	6,042,975
		3,186,592	94,901	345,626					
		3,543,237	126,848		440,545				
		1,978,297	67,262			159,801			
				545,529					
		7,291	261		789,215				
						694,880			
		18,175,074	541,618	1,854,011					
		30,707,705	1,099,336		3,280,696				
		27,068,595	920,162			2,619,852			
				1,243,360					
					2,097,220				
						2,470,811			
		29,900	897	14,209					
		2,291,451	82,036		167,977				
		365,064	12,412			97,631			
				33,665			33,665		
					39,840			39,840	
						47,814			47,814
							206,078	226,762	432,512
				131,220					
					142,982				
				9,000		364,112			
					25,100				
				65,108		7,560			
					58,680				
						60,840			
					9,390			9,390	
						19,437			19,437
								150,000	
									150,000
3,818,556	\$190,928	24,199,977	\$721,384				\$4,801,955		
5,325,180	\$266,258	38,841,135	\$1,390,517					\$7,717,551	
7,271,678	\$374,781	31,693,559	\$1,077,581			\$7,322,766			\$7,322,766



TABLE VIII.

## COAL AND COKE PRODUCTION PER YEAR TO DATE.

Coal.		
YEARS.	TONS (2,240 lbs.)	VALUE.
1836-52 . . . . .	10,000 . . . . .	\$ 40,000
1852-59 . . . . .	25,396 . . . . .	101,592
1859 (2 months) . . . . .	1,989 . . . . .	7,956
1860 . . . . .	14,246 . . . . .	56,988
1861 . . . . .	13,774 . . . . .	55,096
1862 . . . . .	18,118 . . . . .	72,472
1863 . . . . .	21,345 . . . . .	85,380
1864 . . . . .	28,632 . . . . .	115,528
1865 . . . . .	32,819 . . . . .	131,276
1866 . . . . .	25,115 . . . . .	100,460
1867 . . . . .	31,239 . . . . .	124,956
1868 . . . . .	44,005 . . . . .	176,020
1869 . . . . .	35,802 . . . . .	143,208
1870 . . . . .	29,843 . . . . .	119,372
1871-2-3 . . . . .	148,549 . . . . .	493,836
1874 . . . . .	81,547 . . . . .	244,641
1875 . . . . .	110,145 . . . . .	330,435
1876 . . . . .	139,192 . . . . .	417,576
1877 . . . . .	154,052 . . . . .	462,156
1878 . . . . .	170,846 . . . . .	512,538
1879 . . . . .	241,301 . . . . .	723,903
1880 . . . . .	267,595 . . . . .	802,785
1881 . . . . .	228,357 . . . . .	685,071
1882 . . . . .	282,139 . . . . .	846,417
1883 . . . . .	213,299 . . . . .	639,897
1884 . . . . .	394,070 . . . . .	1,182,210
1885 . . . . .	265,596 . . . . .	796,788
1886 . . . . .	326,636 . . . . .	979,908
1887 . . . . .	413,360 . . . . .	1,240,080
1888 . . . . .	489,301 . . . . .	1,467,903
1889 . . . . .	579,830 . . . . .	1,739,490
1890 . . . . .	678,140 . . . . .	2,034,420
1891 . . . . .	1,029,097 . . . . .	3,087,291
1892 . . . . .	826,335 . . . . .	2,479,005
1893 . . . . .	978,294 . . . . .	2,934,882
1894 . . . . .	1,012,953 . . . . .	3,038,859
1895 . . . . .	939,654 . . . . .	2,818,962
1896 . . . . .	896,222 . . . . .	2,688,666
1897 . . . . .	882,854 . . . . .	2,648,562
1898 . . . . .	1,135,865 . . . . .	3,407,595
Total . . . . .	13,217,552 tons.	\$40,034,180

## Coke.

1895-6 . . . . .	1,565 . . . . .	\$ 7,825
1897 . . . . .	17,831 . . . . .	89,155
1898 (estimated) . . . . .	35,000 . . . . .	175,000
Total . . . . .	54,396 tons.	\$ 271,980

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## PROGRESS OF MINING.

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The Province of British Columbia, although as yet only in its early stages of mineral development, has entered into the company of the great mineral producing countries of the world, with no uncertain step. Confidence in her future is based upon the rich promises of the many partly developed mines, which as yet predominate; promises that to a large extent are guaranteed by the results now being obtained from the comparatively few mines, which have as yet been sufficiently developed to become producers; and the foregoing statistical tables show what has been and is being actually accomplished, figures being the only measure we have for commercial success. Attention is directed to the comparatively recent growth of lode mining, and to the greatly increased production of recent years, such production being now eight or nine times what it was in 1894, or over twenty times as great as in 1893.

From these figures it will be seen how young our lode mining industry is, and how rapidly it has increased; and it will then be understood that, almost of necessity, but a small proportion of our known mines have had time to enter the lists as producers.

Increased production during the last year is to be noted in gold—both placer and lode; also in copper; while the output of coal, from the Vancouver Island Collieries alone, has broken all previous records, to which must still be added the output of the Crow's Nest Pass Colliery, which only commenced shipping in November.

While the total Mineral Production of the Province shows an increase, even over last year, the increase is not as marked as it would have been but for the serious dropping off in the output of silver-lead ores.

The reason for this decrease seems to be the unusually low price of silver during the latter part of 1897 and the beginning of 1898, together with the uncertainty as to the future price of the metal. For the time being this paralyzed many existing ventures and prevented new ones being started to work properties of this nature. The drop in price coming, as it did, shortly after a rise in the duty on lead imported into the United States, then our only market, deterred many of our mines from starting work this season. When the price of silver increased again, in the latter half of the year, it was then too late to begin operations for this season.

Again, the certainty of the completion this year of the Canadian Pacific Railway's branch through the Crow's Nest Pass, bringing with it cheaper fuel and transportation, and so enabling our native smelters to compete for ores, has induced many large producers to confine their attention to development and blocking out of their ore bodies, holding back shipments until such time as the new conditions should have taken effect, and higher net values might be obtained for the products of the mines.

Decrease from this cause is a healthy sign, and next year should show a very materially increased output of this class of ore.

The increased production of copper during the past year has been marked, while the present market price of the metal, should it be maintained, will have the effect of bringing into the list of producers a number of new properties, and next year may be looked forward to for a greatly increased production.

While it is unlikely that 18-cent copper has come to stay any length of time, still we have it from an acknowledged authority on the American Copper market that 16 cents will probably be the average price for 1899.

The very greatly increased tonnage of the year from the lode mines is to be noted, and coming as it does from mines of low grade, means that a considerable amount of attention is being attracted to the large low grade propositions which until recently have been untouched.

#### CAPITAL.

The importance, and often the absolute necessity of capital, to bring a prospect through the development to the producing stage is well recognized by our prospecting class, but at the same time they fail to recognize the risk capital runs in putting money into a prospect on which little or no conclusive development has been done. In consequence, the prices asked for properties of this description have been so high that the holders of money were not justified in so risking it.

That there is in the country ample capital, ready and more than willing to invest in any property showing values from definite development, is beyond question, but the money necessary to bring a property up to the requisite point has often been found hard to obtain.

The moneyed men or their agents are usually willing, working on a bond, to guarantee to spend in development work definite amounts within a fixed time and so develop the property in question.

The great trouble seems to be in the demand for cash payments, to be made so soon that it is impossible that sufficient development should be done in the time.

Thus the terms, rather than the amount of the bond, are what have prevented the development hoped for, and the country is tied up, inactive, through what appears to be the unreasonableness of the prospector.

There is, however, another side to the question, which I think it might be well to bring before the capitalist.

The prospector, enduring privations and hardships and running dangers innumerable, spends his whole time scouring the most remote parts of the mountains for prospects; he has no other means of livelihood and must have money enough to buy food and supplies, so that when he comes to tie up a prospect in a bond, though perfectly willing to "stand in with the capitalist on the gamble," still he must have enough cash to enable him to get out into the mountains again to discover new properties. The demand for a small cash payment is thus not as unreasonable as it at first seems.

I am glad to say, however, that there seems to be a decidedly better mutual understanding coming about, the effect of which should be shortly felt.

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#### ATLIN GOLD FIELDS.

Public attention has recently been so much drawn to the placer discoveries in Northern Cassiar, in the neighbourhood of Atlin Lake, that the best available information has been collected with reference to this little-known District, which will be found in detail in the body of this Report.

A sketch map has been prepared by the Lands and Works Department from data thus collected, showing that portion of the country.

The information as to the actual amount of gold brought out in 1898 is somewhat uncertain, but, by collecting data regarding amounts of which actual figures have been obtained, it is estimated that the output was about \$75,000.

The placer discoveries at Atlin, while in themselves important, have still greater importance, in drawing public attention to the existence—well known locally—of the great placer gold belt, extending the whole length of the Province from Wild Horse Creek, in East Kootenay, near the United States boundary (which is credited with a total output of some \$20,000,000), in a north-westerly direction along the western slope of the Rockies, through the famous Cariboo and adjoining gold fields, and still further on through Atlin to the Yukon gold fields in the North-West Territories.

Between Atlin and Cariboo there is still a great extent of country which has as yet been little prospected, and which may eventually prove as rich as its neighbours on either side.

As already foreshadowed in last year's Report, there is strong evidence to show that the gold of Atlin is not confined to placer workings. Samples of very rich gold-bearing quartz from prospects there have already been brought down, and upon these prospects some development will be made this coming year. Whether this District will eventually prove rich in lode mines, it is too early to predict, as little attention has as yet been given to anything but placer gold. Samples of cinnabar have been received from there for assay by this Department and found to contain 26% mercury.

#### GOLD.

While the output of placer gold has not regained the importance it held 20 years ago, still there is a material increase over last year—and, as a matter of fact, over any of the last ten years—showing that the gold is still unexhausted, though occurring under conditions rendering it only available by large operations. The placer miner has largely given way to the hydraulic plant.

The increase this year seems to be pretty well all along the line, each District showing a decided gain.

The production of free milling gold is surprisingly small, when one takes into consideration the amount of rich placer found in the country. Attention is being gradually drawn to this class of mining, and stamp mills are going up in several localities. The increased production of Camp McKinney and Fairview, in Yale District, and the returns from the Fern mine, in Nelson Division of West Kootenay, indicate probabilities for the future. Something less than 200 tons of such ore has been milled at Alberni, on Vancouver Island, and fair results are reported as having been obtained.

So far, all the free milling properties have found it necessary to use some form of concentration, for the collection of gold not existing in a free state, which concentrates have usually been sent to the smelters for treatment.

The first working Cyanide plant in British Columbia has been erected, and is situated on Philipps' Arm, 120 miles up the Coast from Vancouver, in connection with the "Doratha Morton" mine—a full description of which appears in this Report.

The plant has only been in operation for a couple of months, but has already produced satisfactory results, which, it is hoped, may continue, as the continued success of this, the pioneer of its class in the Province, will be looked forward to with much interest, as indicating what may be expected from the large low grade gold-bearing quartz veins occurring along the Coast line.

The ores of the Rossland Camp may be more appropriately classed as Smelting Gold Ores. gold ores than as copper ores, inasmuch as the values of the former metal are proportionately much greater. The output of Trail Creek Division (see tables) is almost entirely from ores of this character—sulphides of copper and iron carrying gold and silver.

These ores are being treated by smelting at Northport, Wash., the Trail Smelter, or at the Hall Mines Smelter, Nelson. The copper acts as a collector for the gold and silver, a matte being produced—the greater part of which is brought forward to refined copper, cast into anodes, and sent to some electrolytic refinery, for the separation of the gold and silver.

#### PLATINUM.

Platinum has been found in the black sands obtained in placer washing, both in the Similkameen and Omineca Divisions. From the former some 100 ounces have been sold this year. It is only recently that attention has been drawn to the existence of platinum in these sands, quantities for years having been thrown away, prospectors not being aware of its value.

To facilitate the detection of platinum, this Department is prepared to test qualitatively, free of charge, samples of such sands sent in from any part of the Province.

#### SILVER-LEAD.

Here these two metals go together, their source being chiefly argentiferous galena, and mined principally in Ainsworth and Slocan Divisions of West Kootenay. While they still hold the place of premier importance in our year's production, the output has this year considerably diminished, for the reasons previously given.

For the two Divisions mentioned, the grade of shipping ores seems to have been maintained, as may be calculated from the statistics, and averaged, on over 32,000 tons of ore, 97 ounces of silver to the ton and 47% lead.

The galenas of East Kootenay are not so high grade in silver, the North Star holding its own this year with about 50 ounces of silver and 50% lead.

Developments of galena properties in East Kootenay, lead to the expectation of shipments next year from the Moyie Mines and from the Sullivan, fully described elsewhere.

Discoveries of galena in quantity have also been made in Windermere Division of East Kootenay, but remain to be proven by further development.

Few "dry ores" of silver have as yet been developed, though a few such exist in West Kootenay.

The Hall Mines, of Nelson, a silver-copper proposition, carrying about 15 to 20 ounces of silver to the ton and 2 to 2½% copper, have smelted over 45,000 tons of ore of this class this past year.



GOVERNMENT LABORATORY — DEPARTMENT OF MINES.





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### COPPER.

Classing the ores of Rossland as gold, and of Nelson as silver-copper ores rather than as copper ores, has removed from the list of copper mines the properties which are really our greatest copper producers, a very unfashionable thing to do in these days when anything branded "copper stock" is so eagerly sought for.

Except as noted above, we have no large copper producers in the country as yet. A few hundred tons of fair copper ore have been shipped from Van Anda, on Texada Island, and a smaller quantity from mines of Vancouver Island, but more as trial than regular shipments.

There are, however, a large number of promising copper prospects in the Fort Steele, and also in the Windermere and Donald Divisions of East Kootenay, many of which are reported on elsewhere. Vancouver Island has also shown up a few prospects which may soon become producers, notably the "Lenora," on Mount Sicker, and certain properties on the West Coast.

With copper anywhere near its present market value, a large number of copper producers will probably spring up this coming year.

### COAL.

This past year has been the banner year in our Collieries, the yearly out-put of the Vancouver Island Collieries alone being 1,126,531 tons—about 100,000 tons more than was produced in any one year heretofore, and to this must be added some 9,334 tons from Crow's Nest—which has only just entered the field as a producer—bringing the grand total for the year up to 1,135,865 tons.

A detailed description of the Collieries will be found in the Report.

### COKE.

Vancouver Island has produced in the neighbourhood of 35,000 tons of coke, the exact figures not being available, and of this amount some 3,167 tons have been exported, the remainder going chiefly to the Kootenays.

The Crow's Nest Collieries have just begun shipping, having before the close of the year shipped some 361 tons of a very superior quality of coke.

### ANTHRACITE COAL.

Anthracite coal has been found on Queen Charlotte Island and on other islands off the coast, but has not been worked as yet, although the prospects are promising.

Large deposits of gypsum, said to be good quality, are reported in the immediate neighbourhood of Kamloops, but no attempt has, so far, been made to work them.

Is also reported from several localities, but the Department has been unable to get any authentic information as to values.

Several finds of plumbago have been made, samples from which indicate good quality.

Occurs in various parts of the Province. From the neighbourhood of Tete Jeune Cache large blocks have been obtained, some as large as 16 x 28 inches, but as yet the transportation facilities are lacking to make it of commercial value.

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## DEPARTMENT OF MINES.

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### WORK OF THE YEAR.

Early in the year, and directly after preparing the report for 1897, Mr. Carlyle resigned his position as Provincial Mineralogist, to accept the management of one of the largest producing mines in the Province.

The vacancy thus caused was filled on June 1st by the appointment of Wm. F. Robertson, B.A.Sc., as Provincial Mineralogist.

Mr. Robertson began his work on the above date, meeting the Minister of Mines at Golden, and, under instructions, began a detailed examination of East Kootenay.

The snow was still heavy on the mountains in the northern portions of the district, and it was found necessary to begin at the southern end, where many of the claims are at a lower elevation; work being pushed northward until the beginning of October, when snow on the higher elevations, near Golden, put a stop to field work in that section.

An attempt was then made to visit the Big Bend country north of Revelstoke, but this was found impracticable on account of unusually early snow, and the Provincial Mineralogist returned to headquarters at Victoria.

The Old Legislative Buildings, mentioned more in detail later, were then arranged and fitted as a mineral museum, and the collections removed from the store-room and displayed in the cases.

In the first part of November, a hurried trip was made to Texada Island, from whence the steamer was taken to Philipp's Arm, an examination being made of a few of the more important properties in these districts, while later in the month a visit was made to certain properties on Mount Sicker, V. I. The remainder of the year was spent in preparing for publication the notes collected and looking after the routine work of the office.

Owing to the great area of the Province, the difficulties of travel, and in some parts the shortness of the season in which field work can be carried on, it is impossible that the Provincial Mineralogist should be able to personally examine more than a small portion of the field each year.

It is consequently the intention of the Department that he should make a detailed report of the various Districts in rotation, following the line of greatest mining development.

The Gold Commissioners and Mining Recorders have supplied information as to the progress of mining in their respective districts, while from those portions of the Province which have reached the producing stage, the tabulated returns of output speak more convincingly of the increasing importance of our mining industries than could any worded description.

This Report gives a very full account of the mining industries of the Province, and every care has been exercised to make it impartial and trustworthy.

### THE OLD LEGISLATIVE BUILDINGS.

The Old Legislative Buildings, having been handed over to this Department for its use, were, during the first half of the year, renovated and so altered as to render them available for the purposes intended.

The buildings have been utilized as follows :—

**Ore exhibit.** The old main Legislative Hall, a room 32 by 76 feet, surrounded by a gallery, and lighted from the sides and from the top, has been fitted with some thirty specially constructed mineral specimen cases, made from the yellow cedar of the country, and provided with sloping glass tops, the interior being a dull black colour, found to be the best back-ground for the display of specimens.

The lower portions of each case is provided with drawers, in which will be kept duplicate specimens, from which collections will be made to send away, and access to which will be allowed students and others studying more minutely the ores of the Province.

This main hall will be reserved exclusively for the exhibition of ores, etc., of commercial value, from the mines of British Columbia, and will in no wise be a general collection of minerals, provision for which has been made in the room to the left of the main entrance.

**Mineral collection.** Here it is intended to have a general mineral collection, irrespective of whence obtained or their value, commercially. A collection of specimens of the typical rocks will also be here displayed, the classification corresponding to that of the Dominion Geological Survey. This collection should prove of great value to students and prospectors as familiarizing them with the more uncommon minerals and which may afterwards be met with in the field.

These collections are made up of specimens collected by the Provincial Mineralogist in the field or received through the courtesy of private individuals who have contributed samples of ores or minerals. It might not be out of place here to appeal to the mine owners of the Province, requesting that they send in specimens, such as are suitable for exhibit, due credit for which will be given on the name card attached to each specimen.

**Geological Maps.** As fast as they can be obtained, geological maps and sections of the Province and elsewhere will be hung on the walls.

**Laboratory.** What was known as the old "lunch room" has been moved back and fitted up as a laboratory, and is provided with gas and water, suitable work benches and shelves, with balances, bullion rolls, etc.

Off the laboratory there is provided a dark room for chemical and photograph work.

**Furnace room.** Back of the laboratory there has been built this last year a brick furnace room, which is fitted with a large two-muffle coal furnace, also suitable furnace and appliances for the melting into bars of such gold dust as may be presented for melting and assay.

**Sampling room.** Underneath the furnace room is a sampling room, provided with hand crushers, bucking board, etc.

**Students' Laboratory.** Back of the main hall is a room thirty-two feet long, fitted up as a laboratory for students in assaying and blowpiping, and is provided with gas, water, etc.

#### ILLUSTRATIONS.

The illustrations in this report are made from photographs, most of which have been taken by the Provincial Mineralogist with a No. 4 Cartridge Kodak.

Those from Nelson are from flashlight photographs for which the Department is indebted to Mr. Norman Carmichael, of the Hall Mines Smelter, while those of the Bonnington Falls Electric Plant, are to be credited to the courtesy of one of the officers of that Company.

The illustrations of the Crow's Nest Pass Colliery are from cuts kindly loaned by the "B. C. Mining Record" and represent the conditions existing late in the fall, long after the visit of the Mineralogist to these properties.

The excellent press-work in their reproduction, and also of the Index Map accompanying this report, is due to the special care of W. H. Clark, Chief Pressman for the Queen's Printer.

#### ACKNOWLEDGMENTS.

The Provincial Mineralogist takes this opportunity of acknowledging the invariable courtesy with which he has been received, and the assistance given him in his field work, not only by the various Government officers, but by every one with whom he came in contact in the Districts visited, newspaper men, business men, generally, and especially by the prospectors

### WORK OF THE LABORATORY.

#### REPORT OF HERBERT CARMICHAEL, PROVINCIAL ASSAYER.

The proper work of the laboratory was seriously interfered with during the first half of the year by the moving of the laboratory into the present quarters in the old Legislative Buildings, and in getting the same fitted up and ready for use, this work not being completed until August.

Since then some 915 assays have been reported, and a large number of qualitative determinations made.

It has been the custom of the Department to determine, qualitatively, free of charge, any mineral sample sent in, returning to the sender any available information as to its value. This privilege has been largely taken advantage of, and is believed to have been of great help to prospectors throughout the Province.

The usual number of assays and determinations have been made for the Provincial Mineralogist, in connection with his field work of the summer, and this year included a number of coal analyses.

A series of investigations has been carried on with a view of determining the presence in the black sands of the Province of metals of the platinum group.

Sands have been examined from widely separated locations but, as yet, platinum and the allied metals have only been found in appreciable quantities in sands from Similkameen and Quesnelle Rivers, in the former sometimes in very appreciable quantities.

In April an examination for "efficiency in the practice of assaying" was held in compliance with section 12 of the "Bureau of Mines Act," two candidates presenting themselves for examination. Of these two, only one passed and was granted a certificate to that effect. Three students have been availing themselves this year of the instructions in assaying, mineralogy and blow-piping.

During the year a number of lots of gold dust were presented for melting and assay, which dust has been melted and sampled while the owner waited for the bar, on which was stamped its weight and fineness.

A large amount of photographic work has been done during the year. The Provincial Mineralogist took a number of photos, illustrating his field work, all of which were developed and printed in the laboratory, a selection being made from them to illustrate his report.

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A number of photographic enlargements, 18 x 22 inches, were made and sent to the Trans-Mississippi Exhibition, where they received very favourable notice.

A number of similar enlargements were donated to the Westminster Exhibition, and also to the Dominion Geological Survey.

A large number of lantern slides were also prepared and sent to the larger Eastern Universities, to be used as illustrations in lectures on British Columbian mining.

Much of such work had previously been done by outside assistance, and doing it in the laboratory has saved the Department considerable expense.

The Laboratory has been at least partially self-sustaining, the fees collected for the year ending June 30th, 1898, amounting to \$569.50 as against \$1,483.00 for the previous year, but this decrease is accounted for largely by the fact, already mentioned, that the moving of the laboratory practically stopped all assaying work for nearly half the year.

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## CARIBOO DISTRICT.

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### REPORT OF JOHN BOWRON, GOLD COMMISSIONER.

In submitting this, my twenty-fourth annual report on the mining industry of the Cariboo District, I am unable to announce any great increase in the yearly gold output; at the same time the actual condition of affairs gives the greatest encouragement that the District is on the eve of a prosperous term that has not been equalled for many years. In former seasons there have been indications of prosperity, but the present year has given evidence of such positive and substantial character that it is safe to predict a greatly increased activity. Many of the smaller properties, hitherto held and worked by individual miners, have been purchased by strong companies and amalgamated into large enterprises, calling for the construction of extensive ditches, flumes, reservoirs and other works of a most substantial nature. This fact has conduced to the curtailment of this year's output of gold, but when the extensive preparations already underway are fully completed, there will certainly be a large increase in the gold yield of the District. While the number of men employed in mining has not materially differed from that of previous years, probably not more than one in four has been actually engaged in the work of gold production.

It is understood that the following well-known placer mines have been either purchased or are held under option by reputed capitalists, who have already begun development work on them on a more comprehensive scale than hitherto undertaken, or purpose so doing as soon as spring opens:

The Alabama and adjoining claims, on Mosquito Creek.

The Meadows, on Williams Creek.

The Bench Claims along Slough Creek.

The Eleven of England and adjoining claims, on Lightning Creek.

The Pinkerton Claim, on Lowhee Creek.

The San Juan Claim, on Williams Creek.

The claims on Conklin's Gulch and French Creek.

The Maud Claim, on Four-Mile Creek, and several others in the vicinity of Quesnelle Forks.

The Discovery Claim, on Shepherd's Creek.

The Boursin and Fry lease, on Cornish Creek.

The Birrell and Polleys dredging leases, on Quesnelle River, and many others.

Though, for reasons already given, the actual gold output for the year shows slight increase, I am happy to be able to report that in no case where development work has been started within the past few years have operations ceased through failure to find gold in paying quantities. Several large enterprises have been steadily carried on for several years and are still being pushed, notably, the Deep Diggings on Slough Creek, and Willow River, and the Hydraulic Elevator proposition on Williams Creek. I append a detailed report on these works, and on others of more recent origin, equally promising.

After the exhaustive review of the late Mineralogist, Mr. Carlyle, in the annual report of the Minister of Mines for 1897, of the physical features and geological nature of the district, I feel that it would be presumptuous for me to attempt any divergence into these fields. I shall therefore confine myself to a description of the work of the different camps.

#### THE SLOUGH CREEK ENTERPRISE,

*Operated by The Incorporated Exploration Company of British Columbia, Limited,  
London, England.*

At the date of the last report, the property of the Slough Creek Mining Company had just been acquired by the above Company, who will develop it and other properties adjoining. During the year the development work has been carried on under the direction of Mr. William Thompson, M.E., F.R.G.S., of London, Managing Director and Consulting Engineer of the Company, with Mr. John Hopp as local manager at the mines.

In order to determine, with all possible accuracy, the depth and location of the old channel of Slough Creek, before sinking shafts and running tunnels to it, additional boring was done with hydraulic jetting machines and the depth as determined by former borings verified.

The management has decided to sink a three-compartment working shaft through the rim-rock upon the Island Mountain side of the property, opposite the mouth of Nelson Creek, and when it has reached the required depth, a bed-rock tunnel will be run from the shaft to intercept the old channel. Lumber, for timbering the shaft, is now being prepared and delivered by the Clarke & McIntyre Mill, upon Jack of Clubs Lake. A large quantity of cord wood, 1,000 cords, has been contracted for, and is being delivered at the shaft site. The necessary machinery for sinking the shaft and running the tunnel, consisting of air compressors, drilling machines, pumps, hoisting-engines, additional boilers, etc., has been provided for and will be installed as soon as required.

During the year several new buildings have been added to the Company's plant at the mouth of Nelson Creek, and a new shaft-house will be built upon the site of the proposed bed-rock shaft.

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### WILLOW RIVER.

On a recent visit to Willow River Camp, I obtained the following definite information regarding this important undertaking :

Work on this deep ground proposition was begun by Mr. Fred. C. Laird, on July 1st, 1894, and has continued without intermission, except such as was caused by the necessary addition of more powerful machinery. The workings now consist of a drain tunnel to the rim-rock, 620 feet in length ; a three-compartment shaft, 200 feet deep, 100 feet of which is in rock, and a bed-rock tunnel to intercept the channel, 650 feet in length. Three openings have been made into the channel wash, but operations were suspended early in the year in order to provide more powerful machinery to cope with the large volume of water encountered.

The new auxiliary plant is now on the ground, and is being installed. The entire plant consists of the following :—

Two boilers, developing 115 horse-power ; two engines, each 50 horse-power ; one 8 x 10 double cylinder Fraser & Chalmer's hoist ; one 9-inch exhaust fan, with 1,000 feet of 6-inch galvanized iron pipe ; one 18-inch Cornish pump, with a 10-foot stroke, which will be actuated by one of the engines ; 1 pair geared plunger pumps ; 1 duplex steam pump ; one 7-inch Nye steam pump.

When the new machinery is installed, which it is expected will be not later than January 15th, 1899, the total normal pumping capacity will be 3,000 gallons a minute. With the water under thorough control, it should be a matter of but a few weeks to cross-cut the channel. I am credibly informed that operations on this property have already entailed an expenditure of \$100,000.

Should this enterprise prove successful, it will prove a great incentive to the development of the vast deep-ground deposits of the District heretofore untouched.

### WILLIAMS CREEK.

#### *Operations of the Cariboo Gold Fields, Limited.*

During the past four years, this company has most persistently and perseveringly prosecuted the work on their extensive system of ditches, flumes and reservoirs, and on the installation of the immense steel pipe line conducting water to their hydraulic elevators. During the past season they made a start in raising gravel. Their plant is the most extensive and powerful of its kind in the world, raising gravel as it does by hydraulic pressure, ninety feet vertically, in one lift. While the trial proved this method of handling the gravel to be entirely feasible and satisfactory, the troubles and set-backs incident to the starting of such an enormous work were experienced, and the opening of the pit from the surface to bed-rock was necessarily slow. Owing to the short season, the capabilities of the plant were not shown under a steady working test. Enough ground was handled, however, to prove the value of the gravel, which was entirely satisfactory.

When the water supply became too small to further work the elevators, a large force of men were busily engaged until winter set in, improving and increasing the water supply, by widening the old and constructing new ditches, building dams to augment their storage system, and, in the light of their working experience, placing the whole plant in perfect working order for the season of 1899.

A complete description of the huge plant operated by this company, and their immense system of water supply, was given in the Report of the Minister of Mines for 1897.

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#### HYDRAULIC MINING UPON SLOUGH CREEK BENCHES.

English capital, represented by Mr. Sam. Medicott has, during the summer and fall of 1898, built two ditches from Jack of Clubs Creek and New Creek, respectively, to provide water for hydraulicing a series of bench claims upon the south side of Slough Creek, which adjoin the property of the Incorporated Exploration Company of British Columbia, Limited. The Jack of Clubs ditch, carrying 1,500 miner's inches, is over four miles in length, and will furnish water for working the leases acquired between Jack of Clubs and Burns Creeks. The New Creek ditch, carrying 600 miner's inches, is one mile and a half in length, and will furnish water for working the leases acquired between New and Nelson Creeks. The construction work has been under the personal supervision of Mr. Melbourne Bailey, M. E., who has used the latest methods in building the dams, ditches and flumes, and has given them a permanent character. The giants to be used will have ball-bearings, and the equipment of both properties will be modern in every particular. The New Creek ditch has been completed, and the plant fully installed ready for operation at the opening of the season of 1899. The Jack of Clubs ditch has been completed, and the lumber for fluming is being distributed along the ditch. The plant to operate the leases between Jack of Clubs and Burns Creeks is on the ground ready for installation in the spring of 1899. Camp buildings of a substantial and convenient character have been built at the mouths of Burns and Nelson Creeks, and will be occupied by the manager and employees of the company.

#### HARDSCRABBLE CREEK.

The Menominee and Marianette Hydraulic Gold Mining Company purchased the Garibaldi claim from Shaw & Son about two years ago. The company began operations by running a drain tunnel from Willow River, 1,200 feet in length, to tap the deep channel of Hardscrabble Creek. Work has been carried on continuously, except when the water supply gave out in the winter seasons; and from the time the workings reached bed-rock in the channel, gold has been taken out. Operations have recently been suspended again, on account of a failure of the water supply, but will be resumed early in the spring. The last ground worked was paying, and was improving as the drive advanced.

#### ANTLER CREEK.

Prospecting work on the property of the "Bradford, Cariboo and Yukon Gold Fields, Limited" was continued during the past season. A tunnel 150 feet in length was run on Antler Creek, above Saw-Mill Flat, at right angles to the present water-course. Twenty feet from the mouth of the tunnel a blind shaft was sunk to bed-rock, a distance of four feet. Ninety-seven feet further in, another shaft was sunk forty-seven feet to bed-rock, the last seventeen feet of which was in gravel, in which a prospect of gold was secured. At the face of the tunnel the depth to bed-rock was found to be twenty-seven feet. A shaft has been started further down stream, and will tap the bed-rock in the channel near the deepest blind shaft in the tunnel.

#### DEVIL'S CANYON.

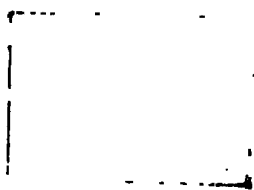
Along Devil's Canyon Creek are a number of benches which have been worked out, chiefly by Chinese. These benches carried coarse gold, and are supposed to have paid well. Although the gold was followed from the foot of the benches down towards the deep ground, as far as water would permit, the old channel of this creek has never been reached.

A partnership of miners, known as the Devil's Lake Mining Company, Limited, is now endeavouring to exploit the deep ground above the canyon. A rock tunnel has been driven more than three hundred feet; this will be extended through rock about sixty feet (estimated) where it is expected to break into gravel.



SWIMMING PACK TRAIN ACROSS THE COLUMBIA RIVER.





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FRASER RIVER.

The Cottonwood Alluvial Gold Mining Company, holding hydraulic mining leases on the Fraser River, near the mouth of the Cottonwood River, suffered, some time ago, a severe setback, by a slide which destroyed several hundred feet of their tunnel, which was run in connection with their seventeen-mile ditch. In September last a large force of men was set to work repairing the damage, and operations were pushed until frost set in. Work will be resumed in the spring, and it is expected that everything will be in ship-shape to take advantage, of at least part, of next season's water.

## LIGHTNING CREEK DRAINAGE TUNNEL.

The British-American Gold Mining and Trading Company, of Baltimore, are engaged on Lightning Creek on a very extensive drainage tunnel. This company acquired the property of the Lightning Creek Gold Gravels and Drainage Company. Operations were commenced during the past season on a tunnel through which it is proposed to drain the old channel of Lightning Creek. The tunnel was started near the foot of what is known as Wing Dam Hill. Twelve hundred feet have been so far completed, most of which is an open cut. Three shifts, of eight hours each, are kept going continuously, and it is proposed to push the work in like manner until the tunnel is completed. It is estimated that the total length of the tunnel and open cut to the bed-rock in the old channel will be 8,000 feet. Major Moore, of Baltimore, Md., is in charge of the work.

## THE WAVERLY COMPANY, OF GROUSE CREEK.

The Waverly Company, of Grouse Creek, prosecuted their work during the water season, and made good progress in steadily improving ground. Just before they began the yearly wash-up a large slide occurred, permitting a clean-up of only a portion of the season's piping.

## THE BLACK JACK COMPANY, OF WILLIAMS CREEK.

The Black Jack Hydraulic Company has been steadily working during every season since 1861. In 1897 their work uncovered a back channel, and this season, with only half a dozen men employed, a clean-up of \$10,000 was made.

## THE ALABAMA AND DISCOVERY COMPANIES, OF MOSQUITO CREEK.

The Alabama and Discovery Claims, on Mosquito Creek, have, this season, maintained their reputation as dividend payers. It is understood that these properties are under option to a strong English Company; and if the option is taken up work will be carried on on a much larger scale than heretofore.

## THE GOLDEN PROVINCE MINES COMPANY, LIMITED.

This Company is engaged near Quesnelle, about three miles west of the Fraser River, on a large undertaking of a somewhat novel but very interesting nature. Briefly stated, the Company is running a rock tunnel, some 1,500 feet in length, to intercept the old channel of the Quesnelle River which, it is believed, passes through the high bluff of basaltic rock situated on Baker Creek at this point. Work has progressed steadily since its inception, and I understand that the work of exploration is nearly completed. I have been unable to secure a detailed account of the work that has been done, but am assured that everything in connection with the proposition is in a most satisfactory condition.

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#### QUESNELLE FORKS SECTION.

The extensive works of the Cariboo, the Golden River Quesnelle, and the Montreal and B. C. Mining Companies, situated about the Forks of Quesnelle, and the Horsefly Hydraulic, the Miocene and the Horsefly Gold Mining Companies, on the Horsefly River, and other works of importance in the southern part of the District are described in the detailed report of Mr. Stephenson, Mining Recorder for that part of the District, which follows this report.

#### SUMMIT CREEK.

Considerable attention has been attracted during the past season to the prospecting work on this Creek of the Klondike Gold Mining and Development Company. Many previous attempts have been made to prospect this channel, but, owing to lack of facilities to handle the water encountered, they were unsuccessful. The above Company, under the management of Mr. F. T. Hamshaw, has been more successful, in that a shaft 80 feet in depth was sunk ; and, while it was found that it was impossible to continue it to bed-rock without machinery to pump the water met with at that depth, yet sufficient data was had to promise encouraging results. Mr. Hamshaw is at present, I understand, in the East, arranging for a plant of sufficient power to thoroughly prospect the ground.

Summit Creek is about fourteen miles in length ; and all of it is held under leasehold or record. A good deal of work has in past years been done upon it, in a small way ; and encouraging prospects have been secured. Should the development work of the above Company and of the others who are exploiting the Creek prove satisfactory, a camp of importance will doubtless be found there.

#### MINERAL CLAIMS.

Another year has passed without adding anything to our knowledge of the capabilities of our District as a quartz mining section. Many promising lodes have been discovered, but little more than assessment work has been done on them, and they are still in embryo.

It appears only reasonable that the wealth of the historic placers of Williams, Lightning, Mosquito and other creeks, must have had its parent source not far from where it was found. The evidence of this is even more convincing when the fragile nature of much of the gold, in nugget form, is considered. Very many nuggets have been found of so friable a nature that they could be compressed in the hand, this proving conclusively that they could not have been carried far from their source, and moreover, in many cases, the gold is found with quartz still adhering to it.

Prospecting for gold-bearing quartz in this section, however, is rather difficult, owing to the deep alluvial deposit, which covers the rock almost everywhere.

If it is a fact that the gold in our creeks and rivers had its origin in the quartz ledges, the discovery of one lode, of a permanent character and of sufficient richness to pay for development and milling, will doubtless lead to the search for and discovery of others.

One fact which strongly militates against us as a quartz mining district, especially in the upper portion, is our remoteness from a railroad. If one of the projected railways becomes an assured fact, I feel sure that this branch of the mining industry will claim due attention in these parts.

#### RIVER DREDGING.

Considerable attention is being attracted to this method of winning the precious metals from the sands of our rivers ; and latterly from the bars formed in the small lakes at the outlet of auriferous streams. So far the work which has been carried on has been almost

entirely experimental. Some 275 miles on the Fraser, Quesnelle, Cottonwood and Willow Rivers; and on the Cariboo, Jack of Clubs and Eight Mile Lakes, are now held under dredging leases. There is probably as much more ground available for dredging purposes, and should the work now being prosecuted in this line demonstrate that the gravels of our rivers and lakes can be handled advantageously and cheaply, it will certainly open up an immense field.

I feel safe in saying that in this District the suction dredges have proved a failure. Some of the companies have adopted the dipper type, but so far have not made a working test sufficient to prove that this is the more advisable method. The Olson dredge, which was worked on the Quesnelle River, some fifteen miles above its mouth, has given evidence of being probably the nearest approach to the dredge suitable for our rapid rivers. This is a machine of the elevator type, and although of less power than either the Pittsburg or McCorkle plants, has been working during the entire season in a very satisfactory way. A second dredge on the same lines is now under construction by the Company.

So far the greatest difficulty that all of the dredging enterprises have encountered is in inventing proper appliances to save the fine gold, which is in very large preponderance in our swift streams. All of the machines are capable of raising large quantities of gravel, but the form or construction best adapted to raising gravel in large quantities and for saving the fine gold does not yet appear to have been hit upon.

The Companies which have been working for several years with very indifferent success are worthy of all praise for their persistent efforts. I feel satisfied that proper methods will yet be discovered for handling the gravel of our rivers, and, as they have already been proved to be auriferous, there will then be added a very important branch to our mining industry.

The Pittsburg and Cariboo Dredging Company, who have concessions near Cottonwood Canyon on the Fraser River, about twenty miles above Quesnelle, met with a serious misfortune this season in having their huge dredge cast high and dry on a bar in the river. Owing to the rapid fall of the water, they were unable to float the dredge without removing the machinery. This unfortunate accident entailed the loss of the season's work, and was the more disheartening as the Company had just completed the installation of a dipper type in place of the suction form hitherto used.

The McCorkle dredge, operating on the Quesnelle River, which was first worked on the suction system and later changed to the dipper type, has passed into new hands, and is, I understand, to be again refitted, this time with a bucket elevator appliance.

Several new dredging companies have recently been formed, giving further assurance that the at least partial failure of the attempts so far made are no deterrent to further efforts.

The number of men engaged in mining will not materially differ from that of previous years. I estimate the number at 350 whites and 400 Chinese and Japanese.

Summary of mining transactions of the District, ending November 30th, 1898 :

No. of individual Free Miners' Certificates issued .....	1373	
" Company Miners' Certificates issued .....	9	
" Creek leases issued .....	28	} 138
" Hydraulic " .....	58	
" Dredging " .....	52	
" Placer claims recorded .....	117	} 264
" Mineral " .....	147	
" Water Records for mining purposes .....	22	
" Certificates of work issued on mineral claims .....	23	
" Applications for leases not yet issued .....	43	

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QUESNELLE DIVISION.—KEITHLEY CREEK DISTRICT.

BY W. STEPHENSON, MINING RECORDER.

A good supply of water for the greater part of the season enabled hydraulic mining to be carried on to good advantage in this section of the District.

Development work has not been carried on to the extent anticipated, only a few companies doing work to any great amount. On the main Quesnelle River, the Maud (Four-Mile Creek), and the two companies owning the dredging leases for the first twenty miles from Quesnelle Forks down, have done a considerable amount of prospecting, and they claim with good results.

On the South Fork of Quesnelle River, the Golden River Quesnelle Company have completed their dam at the outlet of Quesnelle Lake, and were able to work for a short time during the latter part of the season in the bed of the river, obtaining, I believe, very good prospects for their further operations.

The Victoria Consolidated Hydraulic Mining Company carried on prospecting with a good force of men for nearly the whole season on Rose's Gulch, South Fork River, but I have not learned with what results. The Consolidated Cariboo, also on the South Fork, worked as usual with a large force of men for the whole season; in fact, it may be said, for the whole year, as there are at present over thirty men who will continue working for the Company during the winter.

On the North Fork of Quesnelle River very little work was done during the season, three men working on the Moore Company claim, Spanish Creek, and some prospecting work done on the Mather's lease, being about all, except some desultory work by Chinese.

Keithley, Snowshoe, Martin and Harvey Creeks have made no new developments for the season, the small companies working with about the usual results.

On the Horsefly River there has been considerable work done for the season. The Miocene Company got their shaft down to a depth of over 400 feet, and although not positive that they are in the deepest ground yet, they have obtained prospects that the manager—Senator R. H. Campbell—says will pay very well to work, and he (the manager) is preparing to sink a new and much larger shaft than the one from which he has obtained his prospects, and there is very little doubt but that within another year this old channel will be thoroughly tested as to its value.

The Horsefly Gold Mining Company has been running two hydraulic elevators for a good part of the season, and, according to report, with very good success. The Horsefly Hydraulic Mine only worked part of the season. I have not yet learned why they suspended operations. The other companies prospecting on the Horsefly and vicinity have no developments to report for the season.

*Re* quartz mining, there is nothing to report, although in August and September, 1897, there were quite a number of locations made near Clearwater Lake and recorded in this office. I do not know of any work having been done upon the locations.

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### OMINECA LAND RECORDING DISTRICT

Lies chiefly in the Electoral District of Cariboo and described in the "Gazette" in 1874 as follows :

"The Land Recording District of Omineca shall be bounded on the south by the 54th parallel of north latitude ; on the east by the 124th meridian of west longitude ; on the north by the 56th parallel, and on the west by the 127th meridian of west longitude."

To this district a Gold Commissioner and Mining Recorder, Mr. Fred. W. Valteau, has been appointed for the purpose of transacting all such mining business in this district as appertains to these offices. His report on the district follows :

#### REPORT OF F. W. VALLEAU, GOLD COMMISSIONER.

SIR,—I have the honour to submit the following report upon the progress of mining in the Omineca Land Recording District for the season of 1898.

I left Victoria on the 15th March last, as per instructions, and Vancouver a couple of days later, after getting my outfit ready. The spring being so far advanced I was too late to be able to take advantage of the Naas River route, so had to go in by way of Ashcroft, Quesnelle and over the old Telegraph trail to Stuart Lake. This route, while being the best to travel in summer, is by far the most expensive in winter, and especially so at the time I had to go through. I found great difficulty in persuading any men to come in with me, as they were afraid the rivers would be running with ice and the snow too soft for snowshoeing. However, I managed to secure four men at Quesnelle who took me as far as Fort St. James on Stuart Lake, and from there to Manson I got two siwash to accompany me and haul the loads. I arrived at Manson Creek on the 20th April, having been just about a month on the trip in. There are a few old log cabins at Manson, built by the miners in the 70's. One of these I secured and fixed up as an office. There were quite a few men already there when I arrived, the greater number having come in by the Naas River route. Mr. Cotton, engineer in charge of the 43rd Mining and Milling Company's hydraulic works at Manson, was in with his men, and the saw-mill was at work. This season there was a large number of men in the district. The portions which received the most attention were the Nation, the Stranger or Meslinca Rivers, the Omineca River, Oslinca, Driftwood, Findlay, and that part of the district lying to the north of the Omineca River and west of the Findlay. A large number of hydraulic leases have been applied for in these sections. The following is a short account of what has been done upon the different creeks :

#### TOM CREEK

Has been worked for a number of years and is now held by a small company of miners, who have expended quite a sum of money and labour upon a bed-rock flume. This property is at the present time about to be sold to an English syndicate, who propose working it upon a large scale.

#### VITAL CREEK

Is being worked by a company of Chinamen. Leases have also been applied for by a company of Nanaimo gentlemen, who have been prospecting their ground all the past season.

The 43rd Mining and Milling Company have just about completed their work of development, and now have a line of ditch and flume about completed to their ground upon Kildare,

Slate and Manson creeks. They have had a very complete saw-mill working for the past two years. All the steel piping, monitors and elevators are now on the ground, ready to be placed in position. Their flume is 6 feet in width,  $3\frac{1}{2}$  feet deep; the ditch is 11 feet on top, 4 feet on bottom, and 3 feet deep.

#### THE OMINECA CONSOLIDATED CO.

Have not done any work in the division this past season, having secured a lay-over from the Government, although some development work has been done on this Company's claims. A sale of this ground to an American Company is pending at the present time, which I trust will go through, as this large extent of ground, if worked, would advance the interests of the district very much. The greatest drawback to the district is the great expense of getting in supplies, freights being 15 cents per pound from Ashcroft, a distance of about 620 miles.

While there have been no creeks discovered this past season which would warrant men going in there to work them by pick, shovel and sluice boxes, there have been found large areas of gravel which carry gold in quantities that will pay very well when worked by hydraulics, and the following list of applications for leases will show that the men who have been in that district this past season have faith in the future of the Omineca district :

Manson Creek .....	25 applications.
Germansen " .....	32 "
Lost " .....	10 "
Quartz " .....	2 "
Meslinca River .....	15 "
Oslinca " .....	14 "
Omineca " .....	18 "
Vital Creek .....	3 "
Total .....	119 "

I hope to see a great deal of development under way next season.

I beg leave to append below a statement of receipts for the past season.

Free Miner's Certificates .....	\$ 540 00
Revenue Tax .....	186 00
Mining Receipts .....	2,200 00
Total .....	\$2,926 00

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## CASSIAR DISTRICT.

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### ATLIN LAKE MINING DIVISION.

The discovery of promising areas of gold-bearing gravels in the extreme northern portion of the Cassiar District—as yet confined to the western slopes of the Atlin-Teslin divide—has again drawn the attention of the world to the constancy and uniform character and richness of the placer belt of the Province.

Public information concerning the new “strike” reached Lynn Canal ports on August 5th, Victoria, August 13th, a few weeks before the close of the mining season, since which time upwards of 3,000 people, it is estimated, have visited the new fields. Considerable prospect work has been done in the district, together with a fair amount of actual mining; both attended with satisfactory results, the total wash-up being estimated at about \$75,000.

The greater number of those concerned in the summer rush, having secured claims, abandoned the field at the close of the season, being totally unprepared to withstand the rigours of the northern winter, and food supplies being comparatively scarce. Not to exceed 400 miners are now wintering in the vicinity of Atlin Lake. The indications are, however, that the ensuing spring will witness a repetition of the earlier excitement and, in anticipation of immediate development, steps have been taken to thoroughly organize the new Division.

#### TOPOGRAPHY.

Of the great northern reaches of British Columbia, comprising the districts of Cassiar and Cariboo, very little is known, save of isolated portions. Great areas have never been explored for the precious metals. The region under review has heretofore been included under this general category, and has ever been a terra incognita, even to the topographer, appearing on all maps as a featureless portion of the Province. Within the past six months, however, the entire field has been over-run by prospectors encouraged by the gold discoveries of Fritz Miller and his companions in the drainage basins of Atlin and Teslin Lakes, and much has been learned of the topographical and geological features peculiar to the region.

Confining attention to the former of these basins, now officially organized as the Atlin Lake Mining Division of Cassiar District, the information at hand, although more or less general in character, permits me to detail its main features. For the information herein conveyed I am indebted to Mr. Frank Weir, of Atlin City, who has placed at my disposal notes and observations made during an extended survey of the new fields in the interest of eastern capital.

Atlin Lake, the central feature of the district, has an estimated length of from 70 to 80 miles, and a direction nearly north and south for the greater part of its length, expanding east and west along the flanks of its southern boundary, the granites of the Coast Range. Its width is said to average six miles. North of the lake proper, well within the North-West Territories, a smaller body of water 16 miles long empties into the main body through a river of equal length flowing through a low, meadow-like country, but little elevated above the present water level, indicating the identity of the two lakes at no very distant period of time. Signs, indeed, are everywhere apparent of a comparatively recent subsidence of the lake and of its isolation from the Bennett-Tagish sys-



tem, of which it formerly must have formed the integral part. Its enclosing mountains flank or approach its shores for the most part in long, easy slopes often terminating in marsh, and where valleys descend its shores are prominently terraced at uniform levels, and are timbered if at all, with spruce of comparatively recent growth.

The "Golden Gate," a deep indentation in the eastern shore of the Taku Arm of Tagish Lake, 12 miles or more in length, occupies a wide valley running at right angles to the main direction of the two lakes—Tagish and Atlin—a comparatively low moraine, two to four miles in width, alone separating their present waters. Through this moraine the Atlin River has cut its way, and discharges the drainage of Lake Atlin into the Taku Arm, the only known connecting link between these two important bodies. It is worthy of note in thus tracing a former union of the two systems, that the Indians of the district still apply the term Taku Lake to the Atlin Lake of the miners, and only know as Lake Atlin the smaller lake to the north, previously described.

About midway of its length and, approximately, twenty miles south of Pine Creek. the Provincial boundary, Lake Atlin receives the waters of Pine Creek, a more or less rapid stream flowing in from the north-east, and unwatering through its main source Surprise Lake and tributary streams, the greater part of the western slope of the Atlin-Teslin divide. Its estimated length is 16 miles; that of Surprise Lake from 18 to 20, the two bodies running from within a mile or two of the 60th parallel almost due south for the first ten miles, then south-westerly into Atlin Lake. It was on this stream, midway of its course, that gold was first discovered in the district.

Not exceeding fifty feet in average width, save when in flood, Pine Creek occupies a valley from two to three miles wide, flanked by mountain ranges 2,000 feet high, and converging as the lake is approached, terminating somewhat boldly from three to four miles from its present shore. This valley is filled with an immense deposit of gravel—comparatively coarse in kind, well-worn and carrying a fair amount of boulders—through which the creek has deeply cut its way, bearing first to the right, then to the left with many long sweeps and sharper curves on its way into Atlin Lake. For the main part the resultant benches form long stretches of perfectly level ground, fairly timbered, topped in the immediate vicinity of Discovery claim for a short distance by an extensive deposit of clay, the remnant of a stratum that at one time stretched across and along the valley.

At various points in the valley, more especially at what is termed the Geology. Canyon, the underlying rock formations are in evidence, and seem to have been identified as typical Cariboo schists, varying from black to bluish shale to a more or less foliated grey or greenish chloritic or talcose schist. The detrital matter is said to be characteristically a "blue gravel." Quartz veins carrying gold have been discovered on this creek and in various other sections of the district; but values have yet to be authentically reported on.

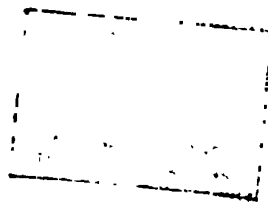
The chief tributary of Pine Creek occupies the valley immediately to Tributary the south, its waters discharging into the larger stream about three and a Streams. half miles above its mouth. It is called Spruce Creek by the miners, and is a considerable stream twenty miles or more in length, with an average width of thirty feet. The valley is wide, and its gravels, similar in character to those already described, are also gold-bearing, as are those of its main feeders, Rose, Placer and Little Spruce Creeks. Discovery claim is situated about three miles from its mouth, and so far as this creek has been prospected its richest ground lies below the discovery. Excellent prospects, however, have been also found some miles nearer its source, low, marshy flats extending



FALLS ON BUGABOO CREEK—GOLDEN DIVISION, EAST KOOTENAY.



HEAD OF BUGABOO CREEK—GOLDEN DIVISION, EAST KOOTENAY.



between for several miles, not permitting the prospector to reach bed-rock on the intervening stretches. Winter prospects have been determined on to establish the value of these flats.

In addition to receiving the waters of Spruce Creek, Pine Creek drains a considerable tract of country to the north through a second tributary which joins it a mile or two below Surprise Lake. This has been mapped as Birch Creek, and has its rise close to, if not beyond, the 60th parallel. Important quartz veins are reported to cross this stream at various points along its course.

Willow Creek, the third most important feeder of Pine Creek, enters it from the north-east, a short distance above Discovery, and runs in the same general direction as the main stream for the greater part of its course.

The topography of Pine and Spruce Creeks above described is that of  
**McKee Creek.** all streams entering Atlin Lake from the north-east, of which McKee Creek, O'Donnell River and Pike River are the most important. These  
**O'Donnell River.** are all gold-bearing, and are from 25 to 30 miles in length, with interlocking feeders draining the divide in every direction towards their sources. O'Donnell River is also known locally as Moose or Cariboo Creek, and is, perhaps, the largest of all the known tributaries of Atlin Lake, averaging sixty feet in width, and discharging a volume of water equal to any two combined of its fellows. Both McKee Creek and O'Donnell River give promise of equalling the discovery creek in the richness of their gravels. The former enters Atlin Lake ten miles below the mouth of Pine Creek, the latter an equal distance further to the south, six miles above the mouth of Pike River.

An area of 1,500 square miles is comprised within that portion of the  
**The Divide.** drainage basin of Lake Atlin extending from the Provincial boundary south to Pike River, and from the eastern shore line of the lake to the height of land separating its waters from those discharging into Lake Teslin. The divide occupying the eastern boundary of the district has a distinctly north-westerly trend and is pierced by an extension of the granitic axis, whose alternating and more or less irregularly shaped masses, preserving a general alignment, appear as a subordinate mountain series extending from the International Boundary north-westward to the Alaskan line in the vicinity of the Yukon gold fields.

The entire district occupied by and immediately adjoining the divide  
**Surprise Lake.** is a lake country, every stream or tributary seeming to have its origin in crater-like depressions or swampy hollows in the higher mountain valleys. Of these the most interesting is occupied by Lake Surprise, the main source of Pine Creek, a body of water 18 to 20 miles long and three miles in average width, which receives the waters of several tributary streams, similar in general character to those previously described as emptying into Lake Atlin. Its counterpart on the eastern slope of the divide is Gladys or Sucker Lake, a body of somewhat greater dimensions discharging into Lake Teslin through the North River of the miners—a succession of connecting lakes, 32 miles in estimated length, and running in a northerly direction. A strip of low-lying “moose pasture,” ten miles or so in breadth, forms the water-shed separating the heads of the two lakes. Thence southerly the divide is very irregular, both in direction and altitude, but is in every way pronounced, being characterised by granite outbursts on every hand.

The two main affluents of Surprise Lake, entering it from the north,  
**Boulder Creek.** are Boulder (or Musket) and Ruby Creeks, both skirting the flanks of granite hills, and rich in promise as regards their value as gold-producing

**Ruby Creek.** streams. Boulder Creek seems especially rich for a mile of its length, from 20 above to 30 below discovery, and authentic reports regarding this area are very encouraging. Ruby Creek has been less developed, but is known to contain satisfactory prospects. The gravels of Boulder Creek are coarser in size than those elsewhere observed, the presence of large boulders in the valley bottom being especially noticeable, whence its name.

On the south side of Lake Surprise, Otter and Wright Creeks discharge into the lake, where skirted by a flat and more or less marshy shore for some miles. Their points of entrance, a mile or more apart, correspond with the narrowing of the lake to discharge itself into Pine Creek; and their general direction is very similar, a little south of west, then north-westerly into the lake. Both creeks skirt granite hills for part of their courses, and are rich in coarse gold wherever bed-rock has been reached, the characteristic shaly bed-rock of all streams in the district, easily broken and with pronounced cleavage. Hemlock, Union, Quartz, and Horse Creeks are additional tributaries of the lake, draining the divide to the south and south-east, and vieing with Wright and Otter Creeks in promise.

The principal tributaries of Otter Creek have been named Topaz, Quartz, Left and Centre creeks, and have prospected favourably. Bonanza and Eagle Creeks enter Wright Creek from the east during the last four or five miles of its length, and likewise carry gold in promising quantities.

Crossing a low divide at the head of Wright and Otter Creeks, the **Dixie Creek.** miners, late in the season, discovered the head waters of a stream they would have known as Dixie Creek, with its main feeders, Bear, Feather, Cariboo, Goose, Slate and McKinley, all within a radius of a few miles. Dixie Creek was not followed to its mouth and bore away to the southward. Its identity with O'Donnell River has been suggested, and there are some who aver that it returns on its course and discharges into Surprise Lake. It is more than likely, however, that, rising as it does on the other side of the divide, it discharges either into one of the tributaries of Gladys Lake or forms an important northern feeder of the Taku River.

The gold in the Atlin Lake gravels is more or less uniform in its **Gold.** nature, being essentially a fine "coarse gold," well-worn and flattened, and varying in size from small colours to that of flax and melon seeds. Larger pieces, worth from \$2 to \$35, are, however, frequently found, some more or less worn, attached to pieces of milk-white quartz. Little or no "flour" gold is found in the district.

Depth to bed-rock varies, being from four to ten feet in the creek bottoms and from two to thirty feet and over where prospect holes have been sunk on the higher benches. In the shallower diggings there is pay dirt almost from the grass roots down. "Spotting" is not characteristic of the district, the more or less uniform distribution of the gold over large areas being a marked feature of the new field.

With appliances of the crudest kind, \$20 per diem to the man has been the average return on the principal creeks, but as high as an ounce an hour has been taken from bed-rock in many authentic instances. No attempt has been anywhere made to reach the creek bed, but facilities for damming and ditching are everywhere pronounced. The constant annual wash from the rich benches adjoining and occasional "slides" of large masses of gravel have, however, undoubtedly enriched the shallow bottom gravels to an appreciable extent, and many claim owners, favorably located, are only awaiting the re-opening of the season to divert the streams. Bars are infrequent in any of the waters of the district.

The altitude of Lake Surprise coincides approximately with the timber line of the region. Below this line the stream bottoms and the shores of Lake Atlin are more or less plentifully wooded with spruce, chiefly of small size, but with isolated groves of good merchantable timber occurring in favourable localities. The whole lower region has a park-like appearance, there being an entire absence of undergrowth. Wild hay and luxuriant grasses covering the marshes afford an abundance of feed for stock, and the agricultural possibilities of the district are by no means uninviting. Wild fruits grow in abundance, and the region teems with grouse, ptarmigan and wild fowl. Game is also plentiful.

Excellent trails traverse the district in every direction, and waggon roads are being opened up between the near-by creeks and Atlin City, the chief distributing point of the region, situated on the shore of Lake Atlin near the mouth of Pine Creek.

#### ROUTES.

But little difficulty was experienced by prospectors in reaching the vicinity of the new district during the past season, lying as it does within easy access of recently established routes of Yukon travel. Steamers plying between the head of Lake Bennett—the common terminus of the Chilkoot and White Pass trails—and the lower river, made alternate trips during the summer from Bennett to the mouth of the Atlintoo River, a distance of about 120 miles, landing passengers and freight within a mile or two of the western shore of Lake Atlin. The construction of the Bennett branch of the White Pass and Yukon Railway, now rapidly approaching completion, together with contemplated improvements in the navigation of the Atlintoo River, will give direct rail and steamer connection between tide water and Atlin City, thus bringing the new mining centre within a week's travel of lower West Coast ports. Lake navigation lasts throughout the entire mining season, opening during the latter part of May and closing early in November.

With the close of navigation for 1898 steps were taken by the officials of the White Pass Railway to open up a winter overland trail from Log Cabin to Atlin City, preference being given to an existing trail locally known as the "Fantail Cut-Off." This route follows the valley of Otter Lake, and is practically level for the greater part of its length, rising slightly during the first 20 miles of its course. Stopping places have been provided at convenient intervals where board and lodging can be obtained at moderate prices. For the information of those travelling this trail, the following has been published by the authorities at Atlin as a matter of expediency: "Coming this way from Log Cabin the first stopping place is a hotel tent, 12 miles. This one can reach either for dinner or to stay over night. Next is the Tepee—20 miles—where Mr. Brooks is putting up a log hotel. Four miles farther is Otter Lake; at its foot—31 miles from Log Cabin—is another stopping place where meals are served and travellers taken in. From there it is three miles to the Ferry house on Taku Arm. From the Ferry house it is four miles or more to the Golden Gate, and 12 miles farther to Taku City. This is the longest stretch of all, as there is no stopping place en route. It is best to arrange for an early start and to allow a whole day from the foot of Otter Lake, or the Ferry house to Taku City. From Taku to Atlin City is a distance of 9 miles, and travellers are warned against attempting to cross either Taku Arm or Atlin Lake after nightfall or during stormy weather, unless they are in possession of compasses enabling them to take correct bearings."

At this writing (February 10) it has been found necessary to abandon the Fantail route for double-sledding, owing to the uncertain strength of the ice on Otter Lake. While safe for pedestrians and light loads, single sleds or dog teams, all heavy loads of freight requiring double-teams are now being forwarded over the Too-Chi trail, which lies a few miles further to the north and offers a more favourable grade. The elevation of Log Cabin above sea level is 2,750 feet, that of Too-Chi Lake 2,320, the intervening distance of 9 miles being a gradual fall. The lake is 22 miles long, and steady northern winds sweep the solid ice free of snow during the greater part of the winter season. From the foot of Too-Chi Lake to Taku Arm the distance is 4 miles and the difference in elevation 190 feet. From this station the trail runs for 34 miles over the frozen surface of Taku Arm as far as Taku City, thence over the two-mile portage, and across Lake Atlin to the common destination. The difference in elevation between the two lake systems being but 70 feet, this forms the only rise in a distance of 51 miles. The total distance from Log Cabin to Atlin City by the Too-Chi trail is given at 85½ miles, as against 65 or 70 by the earlier route.

In addition to the above-mentioned routes by way of Dyea and Juneau Trail. Skagway, a third trail is now being opened up from the town of Juneau, entering the district from the south by way of the Taku, Silver Salmon and Pike rivers. From the head of tide-water on the Taku Inlet—33 miles by steamer from Juneau—the trail follows the bed of the Taku River to its junction with the Kateena or Silver Salmon, a distance of 50 miles. From the mouth of the Kateena to its source, thence across a narrow divide to Pike Lake and down Pike River to its mouth, is a further estimated distance of 40 miles. The latter stream, as already stated, empties into Atlin Lake some 25 miles south of Atlin City, giving a total mileage by this route of approximately 115 miles from tide-water.

#### BENNETT LAKE DIVISION.

The following is gathered from the report of Mr. W. J. Rant, Gold Commissioner at Lake Bennett, the headquarters during 1898 of both Atlin and Bennett Lake Divisions, then one:—

Since the news of the discovery of the Atlin Lake gold fields reached Lake Bennett on July 31st, 1898, these mines have expanded at an extraordinary rate, owing to their ease of access from the Coast and their proximity to the Dawson trail.

The country is flat and open, has a fair supply of timber, and a delightful climate during the summer months.

The route to Atlin City from Skagway is over the White Pass and Yukon Railway to its terminus, thence by road to Log Cabin, where the Custom house is located, from which point, following the water-ways, on the ice in winter and by boat, viâ Bennett, in summer, Taku City is reached, distant from the Coast approximately 120 miles.

A short portage, over a good trail, leads to the west shore of Atlin Lake, across which, on the east shore, Atlin City is located.

Atlin City was surveyed during the summer of 1898, and laid out in lots, and has five stores and certain hotel facilities.

Gold has been discovered on the Dalton trail, and discoveries have been reported about twelve miles east of the Meade Glacier, in this Province, but to what extent is not known.

The mining receipts for the season, up to October 31st, 1898, are reported as follows:—

From Free Miners' Certificates issued.....	\$8,020 00
" General Mining receipts.....	3,289 50

Total.....	\$11,309 50
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### NORTHERN PORTION OF CASSIAR DISTRICT.

The following is gathered from the report of Mr. James Porter, Gold Commissioner for that portion of the District, dated at Telegraph Creek, Nov. 15th, 1898, but not received here in the ordinary course of the mail until January 14th, 1899.

The scattered settlements of the District, and the inadequate means of communication, render impossible any complete report of progress.

A good many placer and quartz locations have been recorded in outlying localities, but no confirmation of their value has been obtainable.

The District last year saw a large influx of prospectors, but, being unprepared, no proper amount of supplies was available, and could not be received until too late in the season to be of any use to prospectors in 1898, but will be consequently ready for the expected rush of 1899.

During 1898 the rush to the Klondike and Atlin drew off many of the mining community, and at the same time raised the prices of provisions and of packing to such an extent as to be prohibitory to the prospector. These conditions are not expected to prevail next season.

Some little excitement was caused late in the summer by a gold discovery on Glacier Creek, which flows into the Stickine from the south at a point six miles from Glenora. The find was made too late in the season to show what may be expected from it later.

So far nothing more than bare assessment work has been done on any of the quartz claims in the District, but in many instances very promising results have been so far obtained, and it is expected that development work will be commenced in earnest in the coming spring.

At the time of writing, the only returns as to placer gold that have been received were from Amos Everson, acting Mining Recorder at McDame's Creek, who places the known output of that Division at \$10,250—an increase over last year.

The revenue from Mr. Porter's district from January 1st to October 31st—but not including receipts at McDame's Creek for October—amounted to as follows :—

From Free Miners' Certificates issued.....	\$3,991 00
“ Mining receipts general .....	1,588 00
Total. ....	\$5,579 00

### EAST KOOTENAY DISTRICT.

#### FORT STEELE DIVISION.

This Division comprises the drainage area of the Kootenay River and its tributaries south of Findlay Creek, and occupies the extreme south-eastern portion of the Province. On the east it is bounded along the watershed of the Rockies by the North-West Territory of Alberta; on the south by the United States boundary line; to the west by West Kootenay, and northward by the height of land forming the watershed of the streams flowing into the Kootenay River, south of Findlay Creek. Approximately 80 miles in width and the same in length, it has a total area of between 6,000 and 7,000 square miles.



The valley of the Kootenay is enclosed on either side by high peaked mountain ranges—to the east the Rockies and the Selkirks to the west. **Physical Features.** Down from these flow the tributary streams in still narrower valleys, winding along the bases of the high peaks; each valley completely walled in from its neighbour and necessitating the following of one to its junction with the main valley, thence up the next, if the traveller seeks to pass from one to the other. This is true not only of the main streams but of all the smaller creeks, it being usually impracticable to drive even a pack-horse over the dividing summit.

The valley of the Kootenay north of Fort Steele has a width between hills of from 4 to 12 miles, part bottom and part bench land. The soil, as a rule, is excellent, although the bottoms often require draining and the benches irrigating. South of Fort Steele the bench land becomes much wider and the country more rolling, forming, in places, prairies of considerable area.

The valleys of the smaller tributary streams have practically no bottom lands, the mountains sloping up from the very edges of the streams.

When traced to their sources all of these streams are found to head in basins, at an elevation of from 5,000 to 8,000 feet, nestling in the mountain peaks and usually surrounded by glaciers, from which snow slides are of constant occurrence. Here the snow lies until June, at times later, but its passing away is succeeded by the appearance of luxuriant herbage and the most brilliant of flowers. This follows so closely that it would seem as if the snowy mantle needed to be but lifted to disclose their presence beneath.

The benches of the Kootenay may be best described as park lands, great stretches of grass covered prairie, dotted here and there with straight and tall trees, chiefly Douglas fir and "Bull" pine; the total absence of underbrush being a notable feature.

**Towns.** Fort Steele, the Divisional centre, is a thriving town on the banks of the Kootenay, near the mouth of St. Mary's River. Here are situated the offices of the Government Agent and of the Mining Recorder for the Division. To the miners of the district it is an important outfitting point, its many stores, good hotels, etc., making it a desirable basis of supply.

Cranbrook, a new and vigorous town which has sprung into existence since the advent of the railway, is a Divisional point on the Crow's Nest Pass branch of the Canadian Pacific Railway. Hotels, stores, bank agencies and all that go to make up a thriving town are already in running order.

The other centres of the Division have not as yet attained any important growth, but under the stimulating influence of railroad communication and the increasing development of the surrounding mining properties several townsites will undoubtedly become more or less important towns within the next few years.

**Transportation.** The southern portion of the Division has this summer been crossed by the Crow's Nest branch of the Canadian Pacific Railway, giving a direct railway connection with the East through Fort McLeod in Alberta, and with the West through West Kootenay, whence other lines of communication run north and west through Revelstoke and south from Nelson and Rossland. The line followed by the railway is shown on the map accompanying this report.

A line of steamers on the Kootenay River runs regularly in summer from Fort Steele to Jennings, Mont. The period of navigation will be considerably extended when improvements in the river channel, now in progress at the instance of the Dominion Government, are completed.

Communication by stage is maintained twice weekly between Fort Steele and Windermere, thence north to Golden on the main line of the Canadian Pacific Railway; by steamer on the Columbia in summer, and by stage in winter.

The Provincial Government has built and maintains good waggon roads along all the main valleys in the district, and from these has provided and keeps in order excellent trails. These latter follow up all the larger creeks and many of the smaller ones where the amount of mining development has justified the necessary expenditure. I found all roads and trails in excellent condition, and it would be difficult to find any part of the Division not accessible by their use.

The mineral development of the District can scarcely be said to have reached the mining stage, with the exception of the Coal Creek Collieries and the North Star and St. Eugene mines, yet it is gradually passing from the prospecting to the development stage. For some years past prospecting has been successfully carried on, and a large number of promising prospects have been recorded, more particularly in the St. Mary's River and Wild Horse districts. Some serious development work has been done on the more important of these claims, but the holders of the majority of them have been content—perhaps from necessity—to limit improvement to the amount of work prescribed by law for annual assessment work.

The advent of the railway has been looked forward to with great anticipation on the part of those interested. By some it has been the excuse for deferring development work until cheaper transportation became an accomplished fact. Now that the railway is into the District the prices asked for prospects have been advanced, often to figures which are prohibitory to capital actually seeking investment and willing to risk it on a prospect only slightly developed. Latterly, however, better counsel has prevailed, many prospects have been bonded on fair terms, and the past summer has seen a large amount of work done by the bondholders, the results of which will soon become apparent.

The following is a somewhat detailed account of the various claims visited by me between June 10th and August 15th. While the list is more or less complete, and embraces most of the claims in the Division upon which important work has been done, or which have been currently reported as promising, there remain unreported on some claims, perhaps as important, of which I did not hear till after my visit to their part of the Division. Comparatively few claims in the Division are Crown granted, and my only means of obtaining information as to the claims in a given section was by personal interview with prospectors and others.

I gladly take this opportunity to acknowledge my indebtedness to the prospectors, business men and journalists of the Division for their uniform courtesy in supplying me with all the information possible. In many instances, prospectors have left their work for a day or more to show me short cut trails, or point out where development work had been done, giving their time freely, and always offering the hospitality of their cabins with that cordiality bred of their independent life.

My travelling was entirely done on horseback, with a small pack train; the distance covered in the Division being between 800 and 900 miles.

### COALS OF THE CROW'S NEST PASS.

The most important mining development in East Kootenay, if not, indeed, in the whole Province, during the past year, has been the opening up of the magnificent coal deposits of the Crow's Nest Pass; a development rendered possible by the completion of a railway giving an outlet, not only to British Columbia markets, but to those as well of the North-West Territories, and eventually to the North-Western States.

The importance of this development will be felt throughout the Province, but more particularly in the Kootenays, for on or near the Coast the Vancouver Island mines have fully supplied the demand for fuel, and can continue to do so at reasonable prices, its carriage not being subject to very heavy freight rates. The coal and coke supplies for the Kootenays, until now derived from this source also, have, however, necessarily been subject to excessive carriage charges, consequent upon a long up-grade haul and one or more inconvenient transfers. Hereafter coal from the Crow's Nest Pass can be delivered into the heart of the mining districts of East and West Kootenay without breaking bulk, delivered in cars loaded at the mine and hauled down an easy grade to all points of consumption. The ideal situation and mode of occurrence of the Crow's Nest coal further admits of its being mined and delivered on the cars at a minimum of cost.

These considerations seem to guarantee to the mines and smelters of these districts a steady supply of first-class fuel at a price very materially lower than has before been possible. Combined cheaper transportation and cheaper fuel will have the effect of so reducing the cost of treatment of ores that it will, to a large extent, necessitate a reconsideration of many of the mining propositions which have had to be temporarily abandoned on account of the present cost of treatment. In like manner, direct rail communication with the Eastern metal markets will enable products to be marketed at a considerably increased figure.

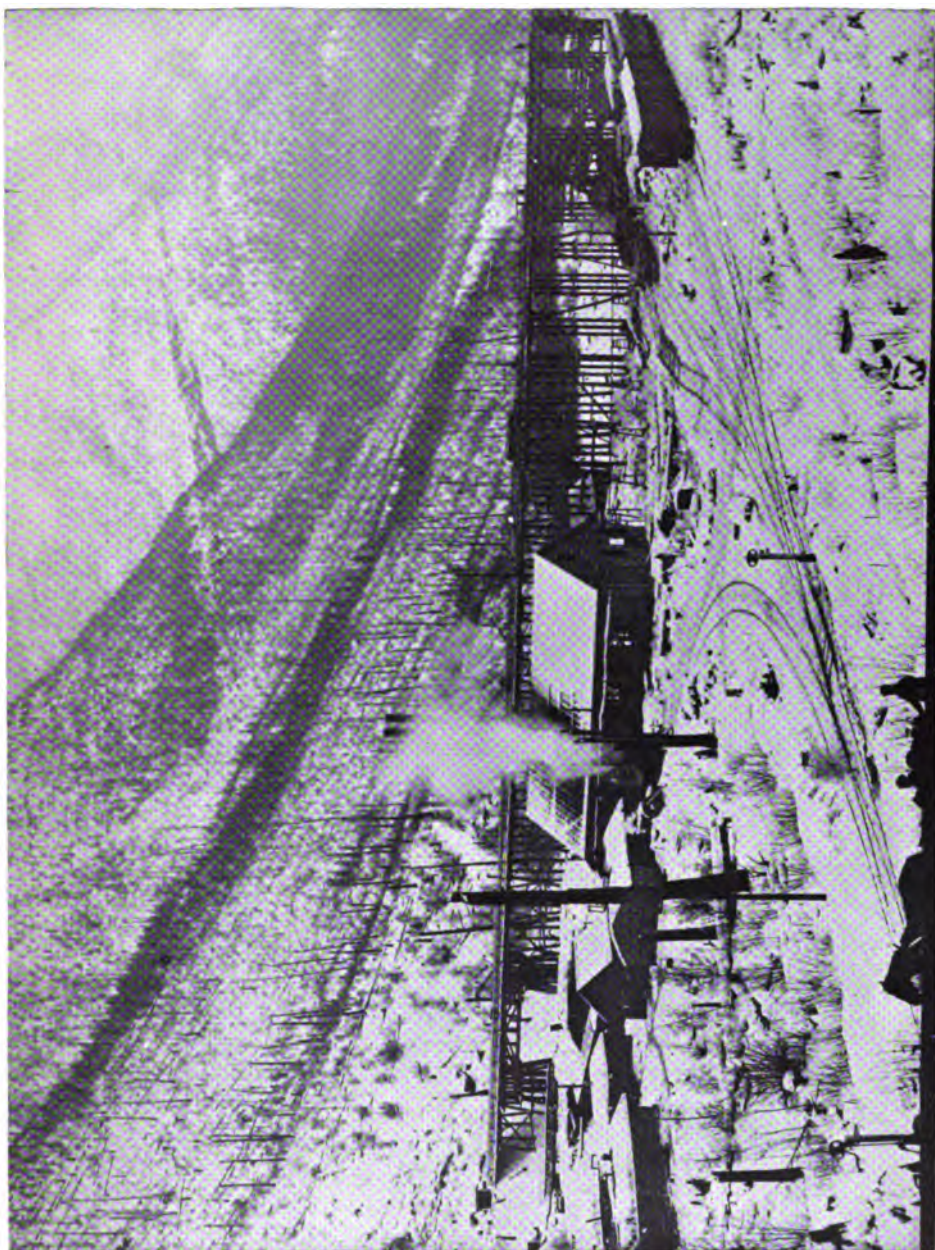
While much may be expected from these increased facilities, they will not do everything seemingly expected of them; they will not make a mine where none existed; they will only lower the line dividing loss from profit, and enable many of our low grade propositions to step over this line and become profitable producers.

To afford some insight into the difference that will be made in this connection, I quote figures which have been given me as to cost of fuel and transportation in the past, and rates that may be expected in the future. I am indebted to Mr. F. Peters, the C. P. R. district freight agent at Nelson, for the following figures, which I understand to be retail prices:—

Freight rate, coal and coke from Coast to Nelson . . . . .	\$ 5 25 per ton.
" " " Crow's Nest to Nelson . . . . .	2 25 "
Price of screened coal at Nelson from Coast . . . . .	10 00 "
" " " " Crow's Nest . . . . .	5 75 "
" coke " " Coast . . . . .	11 00 "
" " " " Crow's Nest . . . . .	7 00 "

One of the conditions on which the grants were made to the Crow's Nest Pass Coal Co. was that "run of mine coal" should be sold at the mine for a price not to exceed \$2.00 per ton, a guarantee for cheap fuel for all time.

The coal deposits of the Crow's Nest Pass have been known to the public for some years, having been the subject of a report in 1891 by Dr. Selwyn, C. M. G., of the Dominion Geological Survey, which report was in part reproduced in the Report of this Department for 1896. Latterly, and since the railway was an assured fact, the coal area has received careful study from those interested, and careful



BRIDGE CONNECTING TUNNELS—CROW'S NEST COLLIERIES—S. E. K.

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measurements made of the seams. I am indebted to Mr. Frank Smith, resident engineer and mine manager of the Crow's Nest Pass Coal Co., for information as to explorations made for his Company.

The coal seams so far known have, for practical purposes, been divided, in ascending series, into :—

1st. The Elk River Basin, bituminous.....	12 seams
2nd. Michel Creek, " .....	7 "
3rd. " cannel coal.....	15 "

Actual work has been confined to the Elk River Basin seams, and these are the only ones I personally inspected.

This series outcrops along the mountains on the east side of Elk River Series. River, from Morrisey Creek to above Coal Creek, at a height of from 1,600 to 2,500 feet above the valley of Elk River. The beds dip to the east into the mountain at a flat angle. The other edge of the basin is said to outcrop some ten miles to the eastward and near the summit of the mountains. The measurements, etc., of this series of beds, as given to me by Mr. Smith, are as follows :—

#### ELK RIVER SERIES OF COAL SEAMS.

Designation of seam.	Thickness in feet.	Work done on seam.	Elevation above Elk River.
12	4	No. 2 tunnel, south side of valley, also exposed in gulch and face-stripped. No. 1 tunnel, north side of valley.	2,500 feet.
11	7		900 ft. sandstones, conglomerates and shales.
10	5		
9	6		
8	4		
7	7		
6	30		
5	6		
4	3		
3	15		
2	30		
1	30		1,600 feet.)
12 seams.	147 feet—Total thickness of coal in		900 ft. vertical coal measure.

The outcrop of this series of beds has been traced and found to cut both banks of Coal Creek, some four or five miles up from Elk River.

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THE CROW'S NEST PASS COAL COMPANY.

Head office, Montreal.

President..... Col. Jas. Baker, Victoria.  
 Vice-President ..... Senator Cox, Toronto.  
 Managing Director..... Wm. Hanson, Montreal.  
 Secretary..... J. A. Gemmill, Ottawa.  
 Treasurer..... E. Hanson, Montreal.  
 General Manager ..... W. Blakemore, Fernie.  
 Mine Manager (certificated) ..... Frank Smith, Fernie.

This company has control of and is working the Elk River seams where they outcrop on Coal Creek. A branch line of the railway has been run up from Fernie, at the C. P. R. crossing of Coal Creek, some five miles to the mines. I visited the property on June 20th, and at that time the construction was only starting, and the mines only beginning to be opened up. Work has been continued all summer, and the mines are now reported to be capable of turning out 500 tons of coal daily.

No. 1 tunnel is on the north side of the valley, and has been run into the hill from the outcrop on the strike of seam No. 5. On June 20th the tunnel was in 150 feet, of which the first 130 feet was through surface wash, the last 20 only being in solid coal. Work was progressing at the rate of 12 feet per diem, and the tunnel is now reported to be in almost 1,000 feet. The coal at the distance reached at the date of my visit was clean and of good quality, though somewhat broken, being so near the surface. The seam was 6 feet thick, and practically free from shale, although there appeared to be a band of from 2 to 6 inches containing "iron-stone," which came in in the mining. This iron, however, was considered to be local as it did not show where the seam had been exposed in other places. The roof of the seam was firm and good, necessitating comparatively little timbering and giving no trouble. The tunnel was permanently timbered for a main driveway.

No. 2 tunnel was driven on the south side of Coal Creek on the strike of No. 7 seam, with a slight rise as it went in, and had then been driven about 1,000 feet, but is now reported in 500 feet farther. Parallel with the main driveway, and 20 feet below it, is the drainage tunnel. Ventilation was supplied by a furnace connecting with a short shaft. The seam is 7 feet thick, free from shale of any importance, and all solid coal. Both roof and pavement are good and solid.

From this seam a winze had been sunk to the No. 6 seam, a 30-foot bed laying below, for the purpose of testing the quality of that seam at a depth. The winze had just reached the coal, on June 20th, which proved to be good, and a level driveway will be run to the west, through which the 30-foot coal will be mined.

The coal, even from the inner face of the present tunnel, was more or less fractured, as though crushed by some movement in the earth, which crushing may disappear as the levels get deeper into the hills. The effect of this fracturing is that a large percentage of screenings will be made, and that the lump coal shipped will be very friable. On this account it will not make as good an appearance on the market, or for use in open grates, as it will scarcely stand the handling, breaking into smaller lumps, although not into dust. The large percentage of screenings produced, however, will not be injurious. They can all be used for coke-making, while the fact that the coal is not in large lumps will not take from its value for steam or metallurgical purposes. The seams so far tested are of "coking coal," producing a strong, hard, bright coke.

Analyses of both the coal and coke have been given in the Reports of this Department for 1896 and 1897, and I shall only add a couple more given me by one of the officers of the Company, as representing the product of No. 2 tunnel :

COAL.			COKE.	
Water .....	0.78	} "Total fuel," 96.49.	Water .....	0.45
Volatile matter .....	20.24		Volatile matter .....	0.90
Fixed carbon .....	76.25		Fixed carbon .....	94.55
Ash .....	2.73		Ash .....	4.10
	100.00	Ratio of fixed carbon to vol. comb. matter, 3.77 to 1.		100.00
Sulphur .....	0.79		Sulphur .....	0.72

A further analysis from the same authority :—

Water .....	0.58	} "Total fuel" = 96.92. Ratio of fixed carbon to vol. comb. matter } 2.96 to 1.
Volatile matter .....	24.42	
Fixed carbon .....	72.50	
Ash .....	2.50	
	100.00	

Sulphur—Not determined.

I have obtained a strictly commercial sample, taken by an expert sampler, of one of the first of the regular "run of mine" coal shipments, on which sample the Provincial Assayer makes me the following return :—

Water .....	1.80	} "Total fuel" = 90.78. Ratio of fixed carbon to vol. comb. matter } 3.85 to 1.
Volatile matter .....	18.70	
Fixed carbon .....	72.08	
Ash .....	6.70	
Sulphur .....	0.72	
	100.00	

The above analysis, on a commercial sample, representing as it does coal taken from comparatively near the surface and from a shipment made before the colliery was in regular working order, must certainly be considered as very good. It cannot but be so considered by practical men, who know what the difference is between a commercial sample and those usually taken for analyses.

In reply to an inquiry addressed to the Superintendent of one of our largest smelters as to the working quality of the Crow's Nest coke, I have a reply in which he states : "With the Crow's Nest coke I find I can accomplish as much with 135 lbs. as I could with 150 lbs. of the other cokes I have used."

From the analyses given it will be seen that the percentage of ash is remarkably low, and the "total fuel" correspondingly high. In the Elk River Series the ratio of fixed carbon to volatile combustible matter is very high, indicating a coal which, in composition, as compared with the usual bituminous coals, approaches nearer to the semi-bituminous and semi-anthracite, although it must still be classed as a "bituminous coal." Compared with the ordinary bituminous coals, for example, the coal from the Coal Creek Collieries does not have as great a quantity of "volatile combustible matter," viz. : constituents which can be distilled



over as gas, but the carbon is there in an increased proportion as "fixed carbon," which might be otherwise described as coke, and which cannot be drawn off as gas under the ordinary conditions of use. A coal of this description will not be so "smoky" as ordinary bituminous coal, but will burn with a brighter and more local flame. It will also produce a greater percentage of coke and a smaller percentage of gas, and consequently will be more valuable for the former and less valuable for the latter purpose, while for domestic use there will be less "soot" sent over and the fire will burn hotter in the fire-box, making less flame.

The following table of laboratory analyses, taken from an article read before the American Institute of Mining Engineers in 1885 by Mr. W. Routledge, manager of the Reserve Colliery, Cape Breton, and used by him as a table of comparison of the various well known bituminous coal districts of the world, will be found interesting, and it will be seen that "Crow's Nest Coal" stands very favourably in the light of comparison. The last column "Total Fuel" or "Total Combustible Matter," I have added to Mr. Routledge's table, and, as will be seen, it is simply the addition of the vol. comb. matter and fixed carbon. It will be noted that Mr. Routledge includes hygroscopic water under the head of "Volatile Matter":

Locality.	Country.	Volatile Matter.	Fixed Carbon.	Ash.	Total Fuel.
Pennsylvania.....	U. S. A. ....	29.50	64.40	6.10	93.90
Virginia.....	" .....	33.68	57.76	8.56	91.44
Indiana.....	" .....	39.00	52.00	9.00	91.00
Illinois.....	" .....	36.59	59.47	3.94	96.06
Iowa.....	" .....	44.00	48.50	7.50	92.50
Missouri.....	" .....	34.06	50.81	15.13	84.87
Newcastle.....	England.....	37.60	57.00	5.40	94.60
Staffordshire.....	" .....	37.86	59.64	2.50	97.50
Derbyshire.....	" .....	35.10	61.65	3.25	96.75
Yorkshire.....	" .....	35.67	62.08	2.25	97.75
North Wales.....	Wales.....	36.56	57.49	6.25	93.75
Pictou.....	Nova Scotia....	29.63	56.98	13.39	86.61
Sydney.....	Cape Breton....	34.07	61.43	4.50	95.50

Crow's Nest Coal, taken on same basis as above.

No. 2 Tunnel—Coal Creek .....	21.02	76.25	2.73	97.27
" .....	25.00	72.50	2.50	97.50
Peter Seam—Martin's Creek.....	34.70	58.30	7.00	93.00
Jubilee Seam, " .....	31.70	68.30	4.20	95.80

The cannel coals, mentioned as occurring on Michel Creek, as their characterization would imply, contain a much larger proportion of volatile combustible matter, and a smaller proportion of fixed carbon. These will have their use principally for gas manufacture and for the somewhat ornamental open grate fires, as they light easily and burn with much flame. The "volatile matter" is said to be about 57 per cent. in these coals.

These beds have not, as yet, been rendered available, as they are not within reach of railway connection and, consequently, have been opened up only by prospecting workings.

From the Government Inspector of Mines, who visited the collieries in November, I learn that since my visit in June the company have connected the No. 1 and No. 2 tunnels, on the opposite sides of the valley, by a 1,000-foot bridge, near the centre of which very complete shaking screens have

Later Develop-  
ment.

been placed, while underneath is ample track accommodation for a large output. Large and handsomely finished offices were built at the mines which, unfortunately, were destroyed by fire later, but they will be replaced promptly. The company's buildings at Fernie were destroyed by fire on the same night.

The mine is equipped with end dumping cars, each having a capacity of 2,240 pounds of coal, and it is the intention of the company to institute a system of electric haulage and electric lighting. Some 15 drop-bottom, 30-ton railway cars were on the sidings for use in transporting coal to the coke ovens at Fernie. Two Murphy fans have been ordered and will be erected as soon as received. Gas has shown itself in the workings, but not in any quantity as yet, and ample provision has been made for ventilation.

At Fernie 30 Beehive coke ovens have been built and are now in operation, with bricks on hand for as many more. It is the intention of the company to erect, in the immediate future, some 200 ovens in all.

It is expected that all the employees will live at or near Fernie, as there is no room for houses at the mines, the valley being deep and narrow, and bounded by steep hills, so steep that in winter the sun seldom strikes down into the valley. Trains on the branch line will carry the workmen to and from work.

It is hard to conceive that any coal deposits could be located more advantageously for cheap and economical working than are the Coal Creek seams.

The working driveways, entering from either side of a narrow valley, at an elevation of some 400 to 500 feet above the level of Elk River, run in practically level, and can be so continued for miles. Above the drainage level of these tunnels the coal extends to the rise, at an angle of almost 20°, for a vertical height of 1,200 feet or more. Each of the driveways will probably be used as an outlet for two or more seams. Timber is plentiful in the immediate neighbourhood for all mine purposes, and Coal Creek is capable of supplying any water power which might be needed for the colliery's use. The estimated cost of production, as appears in the company's prospectus, of \$1.25 per ton, for "run of mine" coal on cars at the mine can certainly be realized.

The amount of coal available in the Coal Creek mines is so great that it will be more than sufficient for a long time to come. I have made no personal estimate of the quantity, but quote from Mr. Smith's report, in which he estimates that the Elk River basin alone has an available tonnage of 16,443,900,000 tons in the twelve seams.

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#### KIKOMUN CREEK.

Title, location. Owner, George Watson, Fort Steele. This claim is situated on the western slope of the Rockies, near the B. C. outlet of the Crow's Nest Pass, and about two miles from the town of Elko, at the Elk River crossing of the railway. The trail from Elko passes along the comparatively level valley of the Kootenay to the mine cabin, situated at the base of the mountain, which here rises at an angle of about 30°. The present workings are from 800 to 1,000 feet above the level of the valley.

The rock formation consists of light grey shales, dipping into the hill to the N.E. at an angle of about 43°, the outcrop being nearly horizontal, and the strike S. 60° E. These shales form the principal part of this face of the mountain. Overlaying them, conformably, is an

"iron band" of some 18 inches, chiefly iron oxides, and above this and forming the top of the mountain are the dolomitic limestones of the Rockies.

The vein appears to be a true fissure quartz vein, of from 5 to 6 feet in width, dipping 78° to N.W. with strike about N. 30° E., and having free walls with marked gouge. The ledge is very porous, and near the mouth of the tunnel is heavily charged with lime. The lead is traceable up the hill, from the tunnel, some 200 feet vertically to the contact with the limestone, when it seems to "dip under." The ore consists of copper carbonates and oxides with rich copper sulphides in places, and occurs in stringers and pockets through the quartz.

At an elevation of 4,025 feet (about 800 feet above the valley) a tunnel of some 100 feet has been driven in on the vein, from which has been taken some very good ore, chiefly copper carbonates and oxides. Sample from ore pile on dump gave 28.8% copper and traces of silver and gold. At the face of the tunnel there was a very fair sized pocket of ore making into the hanging wall, which had not been sounded as to depth. An average across the face of tunnel gave me an assay of 3% copper, traces of silver and gold. Further up the hill and, on the outcrop of the vein, are two open cuts, respectively 75 and 85 feet above the tunnel and some 5 to 8 feet deep. In these cuts a good exposure of ore has been made, chiefly copper carbonates. In the upper cut there is also a pay streak some 6 to 8 inches wide of rich copper sulphides, apparently extending across the ledge and dipping in the vein with the strata. A sample of this richer portion, taken right across, gave me an assay 33.12% copper, no gold or silver.

The property is a straight copper proposition, with little or no silver or gold values. At the time of my visit, June 18, the property was not being worked, but was under bonds to parties in Spokane who, I have since heard, have been developing it seriously this summer, but with what result I have been unable to learn.

### SHEEP MOUNTAIN.

Sheep Mountain is situated at the fork between Elk and Kootenay rivers, about a mile south of the town of Elko. It is a low, rounded mountain, almost entirely covered with wash and earth, sparsely wooded with large trees and covered with luxuriant herbage, which provides splendid feed for cattle and horses, but renders prospecting slow and expensive owing to the few exposures. Quite a number of locations have here been made, however, but few of which have had much more than one or two years' assessment work done on them as yet.

The whole hill seems to be more or less mineralized, with small stringers of quartz carrying copper and silver; quite enough to induce prospecting, but not enough, so far as developed, to guarantee working. The facilities for cheap work are here great,—proximity to the railway, ease of access, easy grades, good timber, and a water-power at Elko, on the Elk River, more than sufficient for any demand for power for either mining or industrial purposes. The Elk River, which in the spring is a wild and uncontrollable torrent, keeps up a good flow of water through the whole summer, being fed from the snow-capped Rockies, which part with their snow very gradually. At Elko the river plunges through a gorge with perpendicular walls of hard quartzite, dropping, by a succession of small falls, a height of about 200 feet in a distance of about half a mile, and offering unexcelled opportunity for the cheap installation of a large power plant.

The country rocks, where exposed, seem to be quartzites, calcareous sandstones, and mica shales, with occasional outcropping of gneiss, the whole cut here and there by igneous dykes.

Title, location. Owned in Fort Steele. Elevation, 3,200 feet. There are several small cuts on the surface, not attaining any depth, however.

**Ramshorn Mineral Claim.** In one of these there is shown up a fairly well-defined quartz vein some 20 inches wide; strike S. 35° W., and dip nearly vertical. The quartz proper shows very slight mineralization, principally blue carbonate copper and some copper pyrites. There is a gouge to S.E. side of vein of some 2 inches of soft talcose matter, which is, in places, heavily charged with carbonates and oxides of copper and traces of rich sulphides of copper. Development is slight and superficial, and the amount of mineral shown up by it is not important.

Title, location. Owner, Thos. Flowers or C. Stephenson, Elko P.O.

**Jennie Mineral Claim.** Elevation, 3,300 feet. This claim is situated one-half mile from the mouth of the South Fork of Elk River. Development consists of a tunnel 8 feet into the hillside, with, 25 feet further up the hill, a pit of some 10 feet in depth; both in what appears to be the bedding plane in the country rock, into which a small quantity of quartz has infiltrated. It carries small quantities of copper pyrites in little stringers.

Owner, Frank Sheriff. Lies next to the above claim, further down hill and to the south. Development here is also very superficial, consisting of little more than surface cuts. In one is exposed a fair-sized quartz vein, with small quantities of grey copper, cutting a bed of quartzite some 30 feet, but seeming to end where it meets a mass of gneiss. In another cut there is exposed a 30-inch lead of grey and white quartz, lying, apparently, between quartzite and gneiss, with about a 2-inch cropping of copper pyrites, said to assay: copper, 26%; silver, trace; gold, \$2.

### SAND CREEK.

Owners, Bishop Bros., Wardner P. O. Elevation, 3,000 feet.

**Bishop Group.** Situated about half-a-mile up Sand Creek from the C. P. R. crossing and the town of Cranston. The claims in this group are the *Jessie*, *Margaret*, *Little Roy*, *Dottie* and *Rob Roy*. Development has all been confined to the two first mentioned claims. The country rock consists of hard stratified shales and slates, with a dip S. 20° W. < 33°.

At the time of my visit, June 23rd, the development consisted of:

1. A lower tunnel started near the creek bottom, cutting into the steep hillside, N. 80° E. for 50 feet, where a turn was made to the right (S. 65° E.) and continued for 20 feet, with work still continuing. This tunnel was being run with the intention of cutting two or three quartz veins, which had been exposed in the upper tunnel, some 200 feet vertically higher up the hill and further to the south. The owners calculated from the dip and strike of these veins that the lower tunnel would cut them, but so far the attempt had been unsuccessful and the work only showed slight mineralization, chiefly iron pyrites.

2. An upper tunnel driven in near discovery point, N. 85° E, for 55 feet, then S. 55° E. for 25 feet. Near the mouth of this tunnel a quartz vein of some 15 to 18 inches was cut at an angle having a strike about S. 45° E. Again, at about 50 feet in a similar vein was cut, and in the face of the tunnel, to the left hand side, another seemingly similar vein was exposed, all three being nearly parallel as to strike and dip.

These quartz leads cut the formation and are fairly strong, but seem to be frozen to the country rock. They might be expected to continue to the level of the lower tunnel, but from

what rough calculations I was able to make at the time, I was of the opinion that the lower tunnel had been driven too far up stream to catch them, even if they did continue. There is little chance of following the leads on the surface, as it is covered with heavy rockslide and earth. The driving of the lower tunnel was attempted on very insufficient data obtained in the upper tunnel. As exposed in the upper tunnel these quartz leads contained copper carbonates and sulphides, with some iron sulphides, and occasionally galena; but not in any appreciable quantities.

Title, location. Owners on record, A. R. Macdonell, F. A. Godsall  
 Empire Mineral *et al.* Locally known as *Major Steele's* claim. Full claim, 1,500 by 1,500  
 Claim. feet, not yet surveyed. Situated near the summit of the mountain, about  
 6 miles N. W. from Cranston Station, and about 1,600 to 1,700 feet above  
 the level of the railway.

This claim is reached from Cranston by a good pack trail, fairly level for the first four miles and rising rapidly for the last two miles, approaching the claim from the north on the easy slope of the mountain. To reach the actual workings, however, one has to go around the very steep south face of the mountain for some 100 yards on a trail existing more in name than in reality, with nothing but a very insecure foothold on the upturned edges of outcropping shales to save one from a rather sudden drop of some hundreds of feet.

The country rock seems to be chiefly shales of a dark gray colour, locally much altered and distorted, and in the immediate vicinity of the vein much crushed. The general strike of the rocks would seem to be about S. 45° E., and the dip about 45° into the hill to N. W. The claim extends down the very steep hillside from No. 1 stake, situated near the summit of the mountain at an elevation of about 4,800 feet, to No. 2 stake, at an elevation some 500 feet lower.

The most important development work has been done at an elevation of about 4,650 feet, and consists of an open 8-foot cut, leading to a tunnel which has been driven in 10 feet; both on the lead. This has cut through a so-called "iron capping," which occurs on the surface at this point, having a depth of some 2 to 3 feet, and a width of about 30 to 40 feet, laying conformable to slope of hill. Underlying this capping and cutting the formation a quartz vein has been exposed in the tunnel, about 24 inches in width, dipping nearly vertical and running into the hill. The quartz carries copper pyrites, occurring in small stringers and pockets, but so far as exposed, not in very great quantity. A very rough sample across the face of the tunnel gave me, copper, 4.60 %, and silver, 2.25 oz. The iron capping, from samples taken by me, contains no values.

About 150 feet vertically below, or at an elevation of 4,500 feet, there is an "open cut," and a certain amount of work done exposing iron capping—here about 25 to 30 feet wide, and about 3 feet thick—showing underneath it the quartz vein similar, though somewhat narrower than in the tunnel above. Still further down the hill some 150 feet vertically, and near the No. 2 stake, the capping has again been exposed but not cut through.

Although at least five yearly assessments have been recorded on this property, the work has been so done as to show very little, and the property must be classed as unproven.

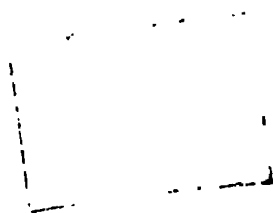
Owners, Langley Bros., Fort Steele. Elevation, 4,300 feet. This  
 Blue Grouse location is an extension of the *Empire*, extending from No. 2 stake down  
 Mineral Claim. the hill and to the westward, and is a full claim, 1,500 by 1,500 feet. The  
 conditions which prevail in the *Empire* probably continue through this  
 claim. The "iron capping" before mentioned, the general trend of which seems to be about  
 N. 85° W., mag., has been exposed in three or four open cuts, and is practically the same in



ELK RIVER—NEAR TOWN OF ELKO S. E. KOOTENAY.



SAND CREEK—S. E. KOOTENAY.



character as higher up the hill, although not showing up quite as wide, being probably here not over 15 feet. The quartz vein is again exposed, and is almost the same as above, carrying copper and iron pyrites in stringers.

The development work done has been so spread out that little beyond proving the existence of the vein has been accomplished, and no positive knowledge of value, even in prospective, could be obtained.

Other Claims Have been located in extension of the Blue Grouse, but from the best information obtainable have little or no development to show. As the travelling was extremely difficult and somewhat dangerous, I did not visit them.

Mountain Mineral Claim and West Extension of same. Title, location. Owner, Alex. McBean *et al*, Wardner P.O. Elevation, 2,950 feet. These claims are situated on a small hill rising out of the plain and separated from the main range of mountains, and are about 3 or 4 miles to the westward of Sand Creek and about 5 miles S. 60° W. from the *Empire* mineral claim. A fair waggon road from the property connects with the main government road which runs from Fort Steele to Elko.

The country rock is composed of slates and shales, laying comparatively regular and little disturbed, dipping S. 15° W. at angle 15°. Somewhat above the present workings there is what appears to be an igneous dyke, some 14 feet wide, across the measures and running N. 20° E. So far as I could see, however, this had no connection with the mineralization as exposed in the workings, nor had it caused any mineralization in its neighbourhood. There does not appear to be any regularly defined vein on these claims, but there are lines of fissure filled with alternating bands of quartz and slate, the bands being a few inches wide, amounting in the aggregate to some 5 or 6 feet. The lower tunnel follows one of the banded leads for some 50 feet in direction N. 65° E. In it was obtained some very fair ore, copper pyrites, with some carbonates; and the amount found seems to have been fully as great near the surface as farther in. The ore is in stringers, which, taken together, across the exposure in the tunnel, would aggregate somewhere about 4 or 5 inches of solid ore. There are on this same lead two pits showing up almost the same condition of affairs. In three additional open cuts two other leads of a similar nature are exposed, not so heavily mineralized; but all leads more or less parallel.

There was quite a fair "surface showing," but, so far, it does not seem to have improved with such depth as has been reached in the tunnel, some 20 feet vertically.

Waterfall Mineral Claim. Title, Location. Owners on record, Langley Bros. *et al*, Fort Steele. Reported to be now held by Robert Dempsey and John Grassick. Situated on the main mountain range, some five miles west of Sand Creek, at an elevation of 3,900 feet, or about 1,000 feet above level of plain. Trail leading to it, from the waggon road at *Mountain* mineral claim, is fairly good until it reaches the foot of the hill, after which it is practically impassable for horses, being a zig-zag over a shifting rock slide.

The country rock is composed of greyish shales and slates, dipping N. 30° E. at angle from 28° to 38°. There is an open cut of some 5 to 10 feet leading to a tunnel of almost the same length, following a quartz vein of from 12 to 15 inches wide, which runs N. 25° W., cutting the formation. The dip of the strata on right of tunnel is 38°, on left 28°, the change in dip causing a fissure, which dips nearly vertical as it cuts each layer of shale, shifting a few inches to the right on each bedding plane. This produces the effect of a stepped fissure



with a general dip of about 80°. It stops and is cut off at the roof of the tunnel by a "slate capping," which does not appear to have been broken.

The fissure is filled with white quartz containing pockets of copper pyrites and galena, with some iron pyrites, giving samples of 6 and even 12 inches in diameter of clean ore, but not as yet in quantity. The vein is exposed in the floor and face of tunnel, but I could not trace it on the hillside below.

### BULL RIVER.

Bull River flows in a southerly direction from the Rockies, and empties into the Kootenay River, near Wardner. Quite an amount of work has been done in this section within the last few years, and numbers of claims recorded, chiefly in the vicinity of the bridge on the old pack trail, where the latter crosses the river at the canyon, a few miles above its mouth.

The "Old Pack Bridge" was a centre of activity on Bull River in the Placers. "early sixties," when the discovery of gold placers, a mile above and below the bridge, made the river famous, and returned small fortunes to many prospectors. The records as to the amount of gold taken out are rather meagre and incomplete, but old timers' estimates place the figures quite high. There is, indeed, no doubt but that a large amount of gold was washed from the river bed; that it was very coarse and of good quality, and that pay-dirt was confined to a very limited stretch of the river on either side of the bridge, that is to say, just above and just below the canyon.

Bull River is at all times a good-sized stream, swift and broad, until it enters the canyon, where it is confined to a width of not exceeding thirty feet by perpendicular walls of quartzites and slates. Through this gorge, in a distance of a mile, the river drops two or three hundred feet in a succession of falls and rapids. Above the bridge the rocky banks are only a few feet above the level of the water. Here the river rushes along, lashed into foam, as two sharp right angled turns obstruct its passage. Straightening itself on its course it makes a wild dash at the bridge as though to sweep it away, but when within a distance of twenty feet it drops suddenly out of sight over a sheer fall of some 80 feet, sending up a cloud of spray in which is hung a most brilliant rainbow, seeming to act as an arch for the narrow bridge spanning the canyon. Below, the river plunges on for some three-quarters of a mile between walls of ever-increasing height till, finally, the gorge is 200 feet in depth, yet scarcely one-half that distance in its upper width. Suddenly the canyon widens into a valley with sloping sides wooded to the water's edge, through which the river now peacefully winds, scarcely recognizable as the mad torrent met with but a few yards further up. The canyon of Bull River, with the unbroken forest to the very edge of its perpendicular cliffs, forms one of the most beautiful bits of scenery in East Kootenay, and it is appropriate that nature should have set it in its golden frame.

Where the gold came from that lay immediately above and below, is a still unsolved mystery. "Pay" extended but a short distance above the canyon and stopped abruptly. The hills on either side have been prospected most thoroughly, yet no gold quartz has as yet been found. Two large igneous dykes, to be later referred to, cut across the river and valley, but there appears to be nothing in them to account for the gold found in the river, particularly in such a coarse state, for but little fine gold was in evidence.

The life of the Bull River placers was a merry one and proportionately short, lasting but a few years. Various attempts have been made in later years to find further placer ground on the river, but without any decided success. Almost every year a small quantity of gold is

taken out by miners who still have faith that the river has not been washed out, and it would seem reasonable to hope that their efforts may be rewarded by new finds.

The country rock is composed hereabouts of alternating beds of hard dark slates and quartzites. Near the head of the canyon the slates are much distorted and folded, although not much broken; while in the canyon and above it the formation is more or less regular. There appear to be few, if any, quartz veins cutting the slates, and certainly none have been found carrying free gold. About a mile above the canyon, cutting across the river, are two large igneous dykes, parallel and some few hundred feet apart, running N. 65° E. Where exposed in a tunnel they have a dip of 65° to N. 25° W., the country rock dipping 17° to N. 25° E. These dykes have been traced from the summit of the mountain to the east of Bull River, across the river and continuing, seemingly without interruption, to Burnt Bridge Creek. On the most southerly of these dykes there have been quite a number of claims recorded, and on them more or less work has been done.

#### MINERAL CLAIMS.

Consisting of the following claims, *Twilight*, *Cuckoo* and *Molly Bawn*, Bull River Group. owned by Geo. Watson, Fort Steele; Geo. Huggarth, Elko; and Jay Usher, Fort Steele. Situated on the east side of Bull River, about one mile above the old pack bridge, and reached by the old placer pack trail.

The country rock is composed of shales and quartzites dipping N. 25° E. at an angle of 17 degrees. The measures are cut by the two large igneous dykes, probably porphyry, some 400 or 500 feet apart, parallel and in a general east and west direction, dipping nearly vertical.

*Twilight* mineral claim has been located on the line of the south dyke where it crosses the river, and the claim lies about half on each side of the stream, extending up the slopes. Development is confined to the eastern slope. In addition to certain surface exposures, there have been two tunnels started—the first or lower tunnel near the river level (elevation, 2,600 feet) driven some 30 feet, and the second a little farther up the hill driven about 20 feet. Both tunnels were on the dyke, nearly in its centre, and ran with it. In each there were observable signs of slight mineralization, chiefly galena, but, so far as I could see, not showing up in any quantity.

The *Cuckoo* mineral claim is an extension of the former claim to the north-east, and higher up the hill on the same dyke. Here a 50-foot tunnel has been run in on the dyke N. 65° E., started on a surface showing of apparently some 12 to 15 inches of mixed sulphides—galena with copper and iron pyrites, which I am told assayed 6% copper, 64 oz. silver, and \$12.00 in gold. Such mineralization as may have been near the surface, however, does not appear to have lasted, for the face of the tunnel is now in solid dyke matter with little, if any, showing of mineral.

The *Molly Bawn* mineral claim lies still further to the north-east and up the hill from the last named claim, and is located on the same dyke. Here a cross-cut tunnel of some ten feet in length has been driven into the dyke from a surface exposure, but so far has shown up nothing of value.

At no point on these claims has any attempt been made to determine whether the line of contact between dyke and country rock is mineralized.

To the westward of the river there has been a succession of locations made on the line of the dyke, which is distinctly marked, and forms the crest of a line of foothills running nearly parallel to the main range. These claims extend over the height of land into the water-shed of Burnt Bridge Creek and, as far as I was able to trace them over the wooded hillside, they are on the same dyke as noted on the eastern side of the river. None of the claims were being worked at the time of my visit, June 27th, and it is quite possible I may have missed some of the developments.

Lying directly to the south-west of the *Twilight* mineral claim are a couple of claims, the names of which I could not obtain, the notices on the stakes being indistinct.

To the south-west of these again we have in succession the *Mabel* and *Chickamon Stone*, and over the ridge on Burnt Bridge Creek are the *Daisy Fraction*, *Silver Chief*, *Silver Reef*, *Silver Buckeye* and a number more which, as yet, are nothing more than locations with little or no work done on them that I could find.

Owners, Johnson and Roberson, of Fort Steele; situated on west side of Bull River. The dyke at this point seems to be nearly vertical, and to have swung around somewhat to the right, A quartz ledge crosses it, but does not seem to have cut the country rock. There is a small open cut on the dyke in which there is a small quantity of copper pyrites showing, but not in quantity as yet. The dyke matter is said to carry gold in places, but not to any high values, and development is such as to really show up nothing as regards the property.

A south-west extension of the *Mabel*, and belonging to the same owners. At an elevation of some 3,600 feet there is an open cut of some 10 feet cross-cutting the dyke. At the end of this cut, in the sidehill, a shaft has been sunk about 10 feet deep, which was filled with water at the time of my visit. In a second open cut, some few feet above the shaft, there is a 10-inch quartz vein which, from the surface, would appear to be dipping right into the shaft, but such examination as I was able to make of the shaft failed to show that the vein continued. This small vein contained copper ore, as carbonates and sulphides, of good quality as far as they went, but the vein did not appear to continue. Some 400 feet south-west from the shaft and 100 feet higher up a small amount of work has also been done stripping the surface. This has exposed a larger and more permanent quartz lead, running with and in the dyke, and also another lead of some 12 inches cutting across the dyke. In both of these the quartz shows patches of galena, but nothing permanent. Still further to the south-west, and near the discovery post, there is another small shaft, about 6 feet deep, sunk on the dyke, and showing small quantities of galena in iron oxides.

#### BURNT BRIDGE CREEK.

The claims located on this creek, so far as I could find, seem to be all on the extension of the dyke which crosses over from the Bull River Valley, and are practically a continuation of the claims of that District.

Held by Thos. Bevans, of Little Bull River. Elevation, 3,700 feet.

*Daisy Fraction.* There are on this property some half-dozen small pits and cuts from 4 to 6 feet deep, exposing what appears to be a fairly well-defined quartz vein, some 8 to 12 inches wide, carrying small quantities of galena. The development is unsatisfactory, and proves nothing.

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Still to the south-west, on the line of the dyke, there is a group of three claims, *Silver Reef*, *Silver Chief* and *Silver Buckeye*, held by Dave Griffith, of Wild Horse Creek, Fort Steele. They are at an elevation of about 3,600 feet, and the assessment work has been done on these claims as a group.

No work has been done on the first named claim, which lies in between the Daisy and the next mentioned. Towards the north-east end of the Silver Chief the dyke has been exposed by a shallow open cut, in which a pit, some 6 feet deep, has been sunk. The cut shows a deposit of iron, some 2 feet thick, which has the appearance of being an "iron capping," and which lies over an exposed quartz vein very similar to that in the other claims, except that it carries a greater proportion of iron. On the Silver Buckeye, an extension of the Silver Chief, a cross-cut tunnel has been driven 100 feet into the dyke. About ten feet from its mouth there is a layer of iron oxide, perhaps 2 feet thick, apparently laying on the face of the dyke. From this point the tunnel penetrates solid dyke matter, not mineralized, until just at the face a quartz vein was cut 10 inches wide, which carries some iron sulphides. About 150 feet to the south-west of the tunnel there is a shaft 15 feet deep, which was filled with water, and which I could not consequently examine. The dump, however, showed indications that an iron oxide capping had been cut, but I could not find anything in sight of value.

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#### DIBBLE BASIN.

Made up of the following claims: *Richmond Hill*, *Last Chance*, *Last Chance Extension* and *Beaver*, *General* and *Foster Fractions*. Owners, Geo. E. Foster, of Ottawa, and C. M. Keep, of Fort Steele. Superintendent, B. Hodge, Fort Steele.

These claims are situated in the Dibble Basin, at the head of Lost Creek, a small creek flowing S.W. from the Rockies down into the valley of the Kootenay River, where it disappears underground at a point 5 or 6 miles below Fort Steele, near "Norbray's Ranch." The property is reached from Fort Steele by a good Government waggon road to Johnson's Cabin, some six miles; thence, a good but very steep trail, some four miles in length, runs up the narrow canyon of Lost Creek; rising from an elevation of 2,700 feet at the waggon road to 6,200 at the mine.

Considerable work has been done on this property, consisting of one tunnel, 500 feet, a second tunnel of 175 feet, an open cut 150 feet long and 5 feet deep on the lead, and a shaft 44 feet deep, with a drift of 14 feet, in addition to other short tunnels and open cuts. There does not seem to be any "true" vein on the claims, but for a considerable distance on the surface an irregular quartz lead has been exposed, carrying copper, with gold and silver, in stringers and pockets.

This lead has been opened at the end by a tunnel and the lead stoped to surface, a height of some 30 feet. From these workings a considerable quantity of ore was taken, which was sacked and part of it "rawhided" down the trail to the waggon road, where it was stored. The remainder was piled up near the mine. Of too low a grade to admit of shipping, the Superintendent, at the time of my visit, was engaged in re-sorting it, and was apparently rejecting a large proportion of the pile. This is the main lead showing on the property and on which the most work had been done. The strike, in general direction, would appear at the surface to be S. 65° W., while the dip at the same point is nearly vertical. Whether this

strike and dip continue is uncertain ; the 500 feet tunnel was run to cut the lead at a lower depth, but failed to do so.

In the shaft, which is east of the main workings, a body of high grade copper ore, gray copper with silver and gold, was found, from which a small amount of ore was taken. I am told a trial shipment was made of ore from this point which yielded a fair profit. At the time of my visit the shaft was full of water and I could not make a personal examination. The development which has been made on this part of the property has not, however, been sufficient to prove any continuous ore body.

The property was being worked by a Superintendent and six men, who were principally engaged in development work. Wages paid miners were \$3.50 a day, less \$1.00 for board. There are a couple of suitable log cabins on the property in good condition.

#### MAUS CREEK.

Owners, Robert Duer and Charles Chapman, Fort Steele. Situated about 8 miles east of Fort Steele, at an elevation of some 4,700 feet, and reached by a trail, at present not very good but capable of improvement should development warrant.

The country rock is composed of shales and slates, with quartzites, all considerably distorted and dipping approximately N. 30° W. I could not see that there was any regular vein on the property, but there was in evidence a zone or band of quartz, mixed with slate, which was all more or less charged with iron sulphides. The lead is said to have assayed about \$4.00 in gold. I took a rough sample across the face as then exposed, but my assay did not show any such gold values, and gave only a small amount in silver. The development work is slight, and consists in an open cut of some 10 feet on the exposed lead.

#### PALMER BAR.

A location, situate between Palmer Bar Creek and Cranbrook. Owners, Watt and Campbell. Elevation, 3,300 feet.

**Eva Mineral Claim.** The country rock is a very dark igneous rock, very much broken and distorted. The formation is as if the whole hillside was one great slide from the mountain and not in place. Yet through these rocks there are several quartz veins which were probably true fissures. Two such veins are exposed for a short distance, the first 12 to 15 inches wide and the second from 8 to 10 inches, with strike N. 24° W. and dip 80° to W. Quite a quantity of blue copper stain appears on the quartz, but little more, so far as I could see. The only work I could find done consisted in an open cut of some 4 or 5 feet on the first vein. As near as I could make out this claim is a re-location of the *Time Check* mineral claim, and the same posts have been used.

Situated about 400 feet west of the *Eva*, on the same range of hills.

**Paymaster Mineral Claim.** In an open cut a quartz vein has been exposed, 30 inches wide, running north and south and dipping vertically. It appears to cut off some 10 feet above the present cut. The vein carries copper pyrites, but not in quantity.

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Location. Owners, Ben Pugh and Wm. Ross, Fort Steele. Elevation, 3,500 feet. Situated near Palmer Bar, half a mile from the C. P. Railway Daisy Mineral Claim. tote road.

There is here exposed in an open cut some 6 or 8 feet deep, a small quartz lead 3 inches in width, cutting irregularly through syenite in a general S. 60° E. direction. Just in the cut there are signs of a local disturbance which has increased the size of a fissure and 10 inches of calcite has been deposited on the side of the quartz. This, however, is very local. I could find, in place, only a few patches of copper pyrites, while on the dump I saw a couple of pieces of rock, probably from the lead, carrying a little galena.

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#### LITTLE NIGGER CREEK.

Made up of *Pay-Roll* and *Paymaster* mineral claims, both locations, and owned by Vandecar, Lattin, Quain and Smith, of Fort Steele. Reached by a fair trail from Palmer Bar, a distance of some 6 miles. Development has been practically confined to *Pay-Roll*. The general country rock is quartzite, but cutting this near the creek is a syenite dyke, running about S. 30° E. This dyke is cut at right angles by a quartz vein some 5 inches wide, dipping S. 30° E. at angle 65°, and showing in an exposure on the hillside. I could not discover that it cut into the country rock after crossing the dyke. This small vein carries some copper pyrites, and a certain amount of "telluride" appears to have been taken out. Assays given me by various disinterested parties who have had samples assayed gave values of from \$200 to \$400 to the ton in gold on picked samples. Free gold can be found in the quartz, often visible to the naked eye. As nothing more than surface exposure has been made and the permanence of the vein has not been established, it is an open question whether the lead can be profitably worked.

The quartzites, forming the country rock, at an elevation of 3,500 feet, dip N. 23° W. at angle of 45°. At the upper tunnel here there is a large pocket of galena showing on the surface, seemingly embedded in quartz. I could not find any true walls to indicate a vein, but the country rock was considerably disturbed and broken in the vicinity of the deposit, probably accounting for this. A tunnel about 20 feet long and of rather irregular shape had been run under this surface exposure, leaving the quartz as a hanging wall and consequently not exposing much of the lead. From data gained in this tunnel, the owners started a second tunnel some 22 feet lower down the hill, with the intention of cross-cutting the lead at that depth, but although in some 34 feet they had failed to do so. I was of the opinion that the tunnel was being driven too far to the left and advised a turn of some 45° to the right, where the lead ought to be met if it continued to that depth.

There has, practically, been no mineral found except on the surface, as noted. There the showing gave good grounds for the hope that an extension might be found when development work had further progressed.

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### PALMER MOUNTAIN.

A location owned by C. H. Austin *et al*, situated a mile or so from the "Old Reservoir" on Palmer Mountain, at an elevation of 3,700 feet. **Great Bear Mineral Claim.** The country rock is composed of rather soft shales and shaley sandstones. A tunnel has been run some 30 feet, entirely in slide save for the last few feet, gaining a depth of about 15 feet. A broken quartz ledge is here exposed, 12 to 24 inches wide. Both ledge and containing rock are part of a large slide and the quartz was practically barren.

Situated on the same mountain at an elevation of 3,900 feet. The country rock is a dark, coarse-grained igneous rock. The tunnel on the **Baby-Lon Mineral Claim.** claim is in 45 to 50 feet, of which three-quarters is through broken slide rock of which the crevices are filled with surface wash. The remaining 15 feet is in country rock, hard and black, and showing absolutely nothing. There is a small quartz vein wandering through the masses of the slide rock, but it appears to be quite valueless. I was quite unable to make out what had induced so much work either on the property itself or on the good trail leading to it.

### MOYIE LAKES.

The Moyie Lakes are a widening of the Moyie River, some 18 miles south of Cranbrook, lying between two lines of low mountains sloping up at an angle of about 25° from the water's edge. The Crow's Nest Pass Branch Railway skirts the eastern shore of the lakes, and is now in operation.

The town of Moyie is situated on the eastern shore of the most southerly of the two lakes, and is already a flourishing little town with three or four hotels, as many stores, and a number of private houses.

The country rock is composed of greyish slates and shales, with beds of quartzite dipping at an angle of about 15° to the east into the hill. On the mountain, just above the town of Moyie, a number of locations have been made, and here is situated the *St. Eugene* mine, while across the lake the *Aurora Group* has been located.

Starting at a point on the lake shore near Moyie City, one or more ledges or dykes, heavily mineralized in places with galena, cut the slates of the hill in an E. and W. (mag.) direction, with a dip to the S. of some 70°, and are traceable from the shore of the lake over the summit of the mountain to the east. Upon the main lead are located the *Lake Shore*, *Moyie*, *Queen of the Hills*, *Loretta Fraction*, *Peter*, *Rose Fraction* and *St. Eugene*, reaching to the summit. Over the summit a number of other locations have been made, but little has been done on them beyond proving the continuation of the same mineralized lead.

On the west side of the lake and almost in a line with the claims mentioned, a number of locations have likewise been made on what is supposed to be a continuation of this lead. The identity has yet to be proven, although there is considerable evidence in support of the theory.

Consisting of the *St. Eugene* and *Peter* mineral claims, and the *Rose St. Eugene Group.* and *Loretto* fractions, all Crown granted (1897) in the names of J. Cronin and J. A. Finch, who have also a mill site on the lake front, close to the railway. The property is under the management of J. Cronin, who, at the time of my visit in the early part of June, was employing about 12 or 14 men in development

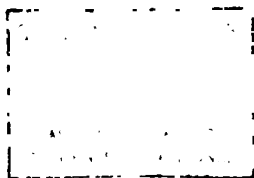


"THE STEEPLES"—FROM JOHNSON'S CABIN, S. E. K.  
(PHOTOGRAPH TAKEN AFTER 8 P. M.)



BULL RIVER, S. E. K.—HEAD OF CANYON—SHOWING STRATA.





work. On the surface, the lead had been traced by various openings for pretty well the entire length of the properties, proving its continuity. The underground development has, however, been so extensive and successful that the surface indications are not of such relative importance. I shall not notice them further than to say that at various points above the present upper tunnel, for a distance of 600 feet, the lead has been exposed, and galena ore, almost solid, has been uncovered of a width at the surface of from 2 to 5 feet.

*Development.* No. 1 shaft was sunk on the vein to a depth of 57 feet, in ore of the width of the shaft all the way, to the level of No. 1 tunnel. No. 1 tunnel, 5 by 7 feet, was run in on the lead for a distance of from 175 to 200 feet, gaining a depth at the face of about 150 feet, and seems to have been in pretty nearly solid ore of the width of the tunnel for the whole distance, the walls being fairly well defined.

*No. 2 Shaft* was sunk about 30 feet to the west from the mouth of No. 1 tunnel, starting from that level and sunk on the lead, and is said to have been in solid ore for a depth of 50 feet, at which depth the solid ore ceased and the vein was only partially mineralized. This shaft has now been connected through to No. 2 tunnel, a vertical depth of 120 feet.

*No. 2 Tunnel.* A cross-cut was driven about 100 feet, and cut the vein at a vertical depth of 120 feet below the No. 1 tunnel. The lead was found to be only slightly mineralized here, and not such as was in the upper tunnel. From this point the tunnel was driven on or on the side of the vein, which continued to show only slight values till a point, some distance to the east of No. 2 shaft, and about 400 feet in, was reached, where the solid ore was again struck. After striking the ore the work had been continued some 250 feet, at the time I saw it in June, and had carried ore for the width of the tunnel all the way in to its face. In this tunnel a couple of small igneous dykes have cut across the lead, but do not appear to have been accompanied by faulting to any extent. At the time of my visit there was a dyke cutting across the face which had not yet been cut through, but from past experiences and surface indications was not creating any anxiety in the minds of the management.

From the development made it would appear that there is an ore chute outcropping on the surface from No. 2 shaft for a distance of 600 feet to the east, so far as yet known; and that such ore chute has a dip of about  $45^{\circ}$  to the east—i.e., into the hill. This ore chute has a width of from 3 to 6 feet, safely averaged at 4 feet, and while it contains a considerable percentage of absolutely solid galena, it is partly made up of ore that should be concentrated. The best class of ore is stated by the management to assay 70 % lead and about 50 oz. of silver to the ton.

The surface openings show up two other leads of similar character, with from 6 to 24 inches of galena, which may be parallel leads or only spurs from the main lead; sufficient development not having been done on them to determine which.

Since my visit I am informed that a waggon road has been built from the mine to Moyie, and that shipments of first class ore will be made this year. Should the development continue satisfactory, a concentrator will be erected on the lake shore and connected with the mine by tramway.

The *Queen of the Hills* and the *Moyie* are full sized Crown-granted Queen of the Hills claims lying directly below and adjoining the *St. Eugene Group*, and are and Moyie owned by F. Houghton, E. P. Davis and others. The *St. Eugene* lead runs Mineral Claims. through both properties, and in places it carries considerable galena; but no ore chute such as exists in the *St. Eugene* has as yet been discovered. On

the *Queen of the Hills* there are three small open cuts showing galena of about the same grade as in *St. Eugene*. On the *Moyie* there is a 75-foot tunnel run in to E. on the lead, with a cross-cut of 15 feet to N., and another of 30 feet to S., showing some galena. In an open cut, at a point where the lead seems to be somewhat distorted, some 18 inches of fairly solid galena shows on the surface, but the showing has not been developed.

A full-sized, Crown-granted claim, owned by Charles Farrell *et al*, and  
**Lake Shore Mineral Claim.** situated below and adjoining the *Moyie* and on the *St. Eugene* lead. Here the vein carries galena in pockets, but has not as yet developed an ore chute.

There is a tunnel on the lead now in about 100 feet. A short distance to the south of the main lead there has been encountered a secondary lead, also carrying galena, but little work has been done on this as yet.

The three claims last mentioned derive much of their prospective value, and quite properly, from the success of the development in the *St. Eugene*; and the fact that they are on the same lead as is that mine. It is to be hoped that a similar ore chute may be found to exist further down the hill. As before stated, the *St. Eugene* ore chute dips away from these properties and to the east.

This group consists of the *Horseshoe*, *Portland*, *Etna*, *Durango* and  
**Aurora Group.** *Aurora* locations, held by Johnson, Sanburn and Neitzel, and is situated on the west side of Moyie Lake. They are supposed to be on an extension, across the lake, of the *St. Eugene* lead, or of the lead appearing to the south of it on the *Lake Shore* claim. The measures here are composed of slates and quartzites, dipping N. 65° W. at angle of 25°. Cutting these is a quartz vein with strike S. 75° W. and dip 70° to S. On the *Aurora* claim, the nearest to the lake, there is a 40-foot tunnel showing up a little galena, but not enough as yet to be profitably worked.

#### WEAVER CREEK.

Weaver Creek is a small stream flowing from the north into the Moyie River, on which, at various points, placer gold has been found. It appears to have been deserted as a placer field, however, of late years, and I found no one at work on the creek at the time of my visit.

Where the trail crosses the stream, two or three miles up from the Moyie, a shaft was sunk a few years back to reach bed-rock on the creek, and from this shaft certain drifts were run. Just how much work was here done I was unable to determine as the shaft was full of water and was no longer being worked. Although the shaft itself is now of little interest, the surface workings are well worthy of brief notice.

The water power present had been utilized to hoist the gravel and water from the deeper workings, the same flume carrying water to sluice-work the gravel. A large over-shot wheel, 20 feet in diameter, was hung on a horizontal shaft of 12x12 timber, on which was a wooden friction wheel, 6 feet in diameter with an 18-inch face. Under this was a second shaft carrying a friction pulley and hoisting drum, so arranged that the friction wheels could be brought together by a long lever, worked from the mouth of the mine shaft. When hoisted the gravel was dumped onto a screen, the coarser material going into a car to be run on to the dump and the screenings into the sluice boxes. The whole apparatus was covered by a log building and the work was carried on in winter under shelter.

The entire plant was constructed on the ground from material at hand, and gives a very good example of what can be made in the way of a hoisting plant at points where it is impossible to get in machinery.

To the west of Weaver Creek and at the base of the hills forming the divide between it and Perry Creek, quite a number of mineral locations have been made and a considerable amount of work done. The claim best known and most developed is the *Prospector's Dream*, around which are grouped the *Old Abe*, *Last Chance*, *Annie*, *Ben d'Or*, *Parker*, *Lennie*, and the *Pauper's Dream Fraction*. How these claims lay I could not exactly determine, so much re-staking had been done, as many as twelve posts being found within a radius of as many feet, and nothing short of an actual survey would untangle the claims. The same general conditions, however, apply to each, and I was able to identify certain works as belonging to certain of the claims.

Owned by J. C. Green *et al*, Fort Steele. The country rock, seemingly, **Prospector's** is entirely of igneous origin, probably a syenite or diorite. A quartz vein **Dream.** has been exposed, outcropping nearly horizontally along the hillside, and **Mineral Claim.** dipping into the hill N. 30° E. at an angle of 15°. This has been developed by a 20-foot open cut leading to a 40-foot inclined tunnel, both on the vein.

In the open cut the quartz was very much broken, but nearer the mouth of the tunnel the vein was more solid and showed a width of 5 feet of solid quartz. Following the tunnel down, the width of quartz seems to gradually diminish, until at 40 feet in, the vein has only a width of some 6 inches. About 15 tons of quartz, of a rusty nature, was piled on the dump, which is said to run \$10.00 in gold to the ton. The vein-matter will show free gold in the pan almost anywhere, but not indicating high values. The apparent pinching out of the vein in this one tunnel has discouraged for a while, deeper prospecting and the continuity of the vein to the dip remains to be proven.

Whether the gold obtained is the result of the weathering of iron sulphides carrying gold, or whether it will continue to a depth as free gold, has not yet been determined.

I am informed that one or more shafts have been sunk on this property on another vein, but these shafts I was unable to find, being filled, doubtless, with water. In these the vein showing is said to be nearly vertical and to carry a width of some 5 feet of quartz with gold values.

*Old Abe*, owned by Steve Young *et al*, of Fort Steele, is practically an extension of the claim just mentioned.

Located by Nitzel and Johnson, is supposed to lie between *Old Abe* **Pauper's Dream** and the *Prospector's Dream*, some 100 feet east of the workings on the **Fraction.** latter. The area of this fraction is uncertain, until the prior claims have been surveyed. There has been some work done on the property, consisting of an open cut and two tunnels, 10 and 8 feet respectively. The fraction was evidently located to catch that portion of the *Prospector's Dream* lead which may not be covered by the main claims.

The *Last Chance*, owned by Wm. Haupt *et al*; *War Eagle*, Hy. Kershaw *et al*; *Annie*, Wm. Thompson *et al*; *Ben d'Or*, J. C. Green *et al*; *Parker*, Gus Theiss, and *Lennie*, J. S. Parker, all of Fort Steele, are all locations in the same vicinity, but with only slight development work done on them that I could find. The limits of these claims I was unable to distinguish without a survey, in the absence of the owners to point out the true lines.

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### PERRY CREEK.

From Weaver Creek, I followed an old trail leading to the summit of Bald Mountain, on which a number of locations have been made by E. J. Walsh and others. Such of these as I could find were on rather strong quartz leads of considerable width, but without any very strong apparent mineralization. The work done amounted to little more than one year's assessment work, and the locality has not as yet assumed any great importance.

I camped overnight, July 24th, by a spring near the summit of the mountain, at an elevation of some 7,000 feet, and many of the depressions were still filled with snow, but everywhere else above timber line there was a most luxuriant growth of grass, splendid feed for horses being found there throughout the summer. The valleys being generally covered with a dense growth of timber and underbrush with little or no grass, these high level grazing lands are of great value to the prospector, enabling him to keep his pack horses near him for use when required; and numbers of such horses from the various prospecting camps in the valleys are to be found here at any time during the summer.

I failed to find a trail leading past the summit, here 7,600 feet in elevation, but experienced very little difficulty in getting down into the valley of Perry Creek, opposite Sour Dough Creek.

Perry Creek in past years was the scene of considerable activity as a placer field, although little, if any, successful work of this nature is now in progress. The centre of activity seems to have been "Old Town" or "Perry City," which, judging from the remains of old dwellings and stores, must once have been a prosperous town. Now, however, it boasts of one "hotel," the only habitable building left, although not in use as such at the time of my visit.

There is a fairly good waggon road connecting "Old Town" with both Fort Steele and Cranbrook, via "The Mission," which was built in the placer mining days.

The stream has been worked for placer gold with varying success for a mile or more above the old town, or as far up as the Falls, and has yielded, as a whole, a considerable amount. At the Falls, and for a distance of two or three miles above, little gold was found in the present channel of the creek. The older channel for this distance passes apparently to the east of a small mountain, which separates it from the present stream. Immediately below the Falls a tunnel has been run in on this old channel, and is said to be in nearly 1,000 feet, a lower or drainage tunnel following it all the way. This has been for some time abandoned by the constructing company, yet is worked occasionally by individual prospectors, who take out good wages.

Two miles above the Falls, near the "Old Shaft," the stream was worked quite extensively by surface sluicing and a shaft sunk to bedrock from 100 to 200 feet deep, from which considerable gravel was removed, but with what result I was unable to learn. The shaft is now filled with water. Here again is to be found a most ingenious and beautifully constructed overshot water-wheel, arranged to do the hoisting and working by an eccentric pinion shaft, a line of rods connected with a "bob" working a deep level plunger pump in a separate compartment of the shaft.

The placer record of the stream drew special attention to the creek and its tributaries, and a great deal of lode prospecting has been done from Old Town to the head of the creek. A large number of claims were, from time to time, recorded, many of which were justified by the discoveries made, but as many more on no apparent values. The work done has proved, however, that there are without doubt a number of very strong parallel quartz ledges, some of great width and traceable for miles, running S. 20° W. or about parallel with the general direction of the creek and dipping nearly vertical.

These ledges are found on the north-west side of the creek, near Sour Dough Creek, through the length of some 18 claims, or for about 5 miles, while further down the creek they re-appear on the opposite side of the stream. The exact point at which they cross I could not determine in the short time at my disposal, but probably about a mile above the "Old Shaft."

The best exposure of the whole series of ledges lies some two miles above Sour Dough Creek. At this point—starting at the ledge highest up the hill—there is a 10-foot quartz ledge exposed in the *Buck Horn* and *Big Horn* claims. Some 1,500 feet below this again is the Big Ledge, about 40 feet wide, on which is a string of some 15 to 18 claims in line, *Teller*, *Apex*, *Cashier*, *Banker*, etc., etc. About 400 feet below the "Big Ledge" is a third, an 8-foot ledge, and again some 1,000 feet lower a series of some three or four 5-foot ledges parallel to each other and about 100 feet apart.

The country rock is composed of hard shales or slates with quartzites in thin beds, the strike of the beds being S. 20° W., with a dip of 55° to the west.

The strike of the country rock and of the quartz ledges are identical, but the dip differs. The upper side of the ledges seems to be fast to the country rock, but on the lower side, in many places where exposed, there appeared to be an igneous dyke of "miner's porphyry," much decomposed on the surface. This was most noticeable on the claims furthest down the creek.

These ledges and the accompanying "porphyry" will give gold colours at almost any point where tried but, as yet, only surface trials have been made. Scattered through the quartz in small grains are iron sulphides carrying gold, and it is an open question whether the free gold found on the surface is not from the weathering of these sulphides.

The following are a few of the locations visited, selected as best showing up the general character of the ledges:—

These are locations on the upper or 10-foot ledge, and have been developed by a shaft 14 feet in depth. Owners, Watson and Usher, of Fort Steele. They are the only claims showing any development on the upper ledge, and the gold values obtained were not over \$2 to the ton on supposed average samples from the present development.

Consisting of the *Banker*, *Cashier*, *Apex* and *Teller* mineral locations, owned by T. J. Moffatt, of Butte, Mont., and Geo. Watson, Fort Steele. These locations are all on the "Big Ledge," which is easily traced through the four claims. Very little work has been done on them beyond a few shots put in on a large surface exposure. An average sample taken across the face at the surface is said to have assayed \$2 in gold.

This lies to the north of the *Moffatt Group* on the "Big Ledge," and is owned by T. H. Fenwick, of Fort Steele. Here a little surface work only has been done.

The first-named is owned by L. V. Burden, Fort Steele; the two latter by Stevens and Patty, Fort Steele. These are all locations still farther to the north on the "Big Ledge," and have each been developed by short tunnels or shafts of some 15 feet, and give "colours" in the pan at the surface. Assays have been obtained from the quartz as high as \$10, but no work has been done to show what the average assay would be.

The British-American Corporation hold some seven claims, the *Perry*, *May-bee*, *Eva*, *Southern Girl*, *Gold Bug*, *Bozeman* and *Manhattan*, located on the lower series of ledges, on each of which a couple of years' assessment work has been done. All show gold, I am told, not in great quantity, yet still more or less promising.

Owners, Emil Banks, *et al.*, Fort Steele. On this property both the Shakespeare Mineral Claim. "Big Ledge" and the 8-foot ledge show up, the former, here 40 feet wide, being accompanied by a "porphyry" some 200 feet wide, as indicated by small pits. Assays from solid quartz are reported to have given values of some \$8 in gold, the porphyry, near the quartz, giving \$16 gold. My own sample and assay from a pit sunk 10 feet deep near the contact gave \$6 in gold across a face of five feet, while across the face of the exposure, on the 8-foot ledge, my assay gave \$4 in gold to the ton.

Consisting of two claims owned by Sherwood *et al.*, located to the north of the Shakespeare, and also covering both ledges. The work has been done chiefly on the lower ledge, where a cross-cut tunnel has been run in cutting the ledge about 40 feet deep, and a drift on the ledge has been run about 20 feet to the left. The ledge here seems to be much crushed and broken at this depth. The dirt, when tested by me by panning, proved very irregular, some pans giving very good colours, and others none whatever. There is also a small pit sunk on the outcrop of the ledge to a depth of 4 or 5 feet.

At the request of one of the owners I sampled, 1st. The dump from the lower tunnel which, on assay, gave me only a trace of gold; 2nd. Loose dirt from the upper cut; assay, \$10; 3rd. A sample of pure white quartz supposed to carry free gold, not visible, assay, no values. I am satisfied from assays and general indications that the gold is with the iron sulphides, and am confirmed in my opinion as to the inaccuracy of individual small samples in such a proposition. On the dump from the tunnel I found some 20 tons of ore in which gold was visible to the eye, but usually near the "iron."

These are two claims on the same series of ledges, on the south-east side of the creek, just above the "old shaft," held by "The Perth Syndicate." On the former are two shafts respectively 25 and 10 feet deep, on a 5-foot ledge, while on the latter there are two openings of 25 and 10 feet on a ledge over 12 feet in width. I have been unable to ascertain the values obtained.

*Running Wolf* is a location owned by J. H. Harvey, of Fort Steele, on the same ledge as the *Elk Horn*, and has two open cuts, each of 10 feet.

Owned by Gus. Theiss, *et al.*, of Fort Steele, and located on the creek about three miles above "Old Town." A tunnel had been run from the creek bottom into a bluff of talcose schists and quartzites for about 60 feet, from the end of which drifts were set off some 20 feet on each side. No vein was to be seen in the tunnel, while in the drifts there were a few quartz stringers carrying no values. I was unable to see why the tunnel had been driven, but am told that good gold values were obtained in the schists at the creek, possibly washed into the crevices by the stream.

Recognizing the futility of trusting to small samples, and that a satisfactory test of the various properties could only be determined by a practical test, Mr. J. E. Hardman, mining engineer, of Montreal, had a small stamp mill erected during 1897, at the mouth of Saw Mill Creek, for the purpose of making mill tests of the ore from the various properties he had under bond. The mill is a small 5-stamp battery, so constructed as to be easily portable, manufactured in Nova Scotia, and is driven by a small upright engine supplied with steam from a vertical water-tube boiler. It is provided with the usual amalgamating plates, etc., for the collection of any "free gold,"

and is, as a whole, a very complete and well-constructed little plant. This mill was set up under the roof of the old saw-mill.

Test runs were made on ore from several of the claims on the creek, in lots of 5 to 10 tons each. The results obtained were not commercially satisfactory, for, notwithstanding the fact that some gold was saved, in no instance were the values obtained sufficiently high to warrant serious work on the claims. The tests, however, do not seem to have satisfied the claim owners, as the results obtained did not tally with their private assays. I heard several complaints about the matter, regret being expressed that the running of the mill had been left to inexperienced men, and the values allowed to escape in the tailings. Of this I know nothing further than was told me by men who might be considered "interested parties."

It was, of course, impossible for me to form any opinion as to how the mill had been run, except by testing the tailings, which I did in the presence of a well-known engineer and mill man, Mr. Farrell, of San Francisco, who likewise made several independent tests for his own information. The tailings from the mill had run down to the creek bottom, some 100 feet, over gravel, and had been subjected to a winter's snow and rain. I panned the mixed gravel and tailings over all of this distance, and in each pan I found I could save, besides the iron sulphides to be expected, a globule of mercury as large as the head of a match, and a string of amalgam in the bottom of the pan from a quarter to half an inch long. On driving off the mercury on a hot iron I found I had left a very fair sized particle of gold. I collected some of the mercury and amalgam, which I turned over to the Provincial Assayer, who reports to me that the mercury carries over 2% of gold, while the "black sand" contains \$20.00 in gold and a trace of silver. Samples which I took of the tailings gave me on assay as high as \$4.00 in gold.

As the result of my investigation, I am satisfied that the mill did not save such free gold as may have been in the ores, and that the tests made were not conclusive as to the values of these properties. I am further satisfied that only a portion of the gold is "free," and that some method of concentration would have to be adopted to save the gold occurring in the iron sulphides.

The mode of occurrence and the great strength and permanence of the ledges on Perry Creek, taken in connection with the fact that gold occurs in all of them, makes this creek well worth the attention of a strong prospecting company, as the work is of such a character as to be too expensive for the present holders of the majority of the claims.

Since the stamp mill tests were made public a great majority of the claims have been allowed to lapse, and the remaining claimholders seem inclined to listen to any proposition which will enable them to prove up their claims in a practical way.

These are two locations made on the mountain about two miles to the south-east of "Old Town," at an elevation of 3,800 feet. The country rock is composed of schists and quartzites, in the strata of which are several irregular quartz leads from 12 to 15 inches wide, on which a couple of 10-foot pits have been sunk, showing a slight mineralization but not of much promise. While situated on Perry Creek, these leads are not in any way connected with the main ledges of the creek.



## ST. MARY'S PRAIRIE.

Owners, J. Angus, W. Tarrant and J. T. Laidlaw. Situated on the low range of hills lying to the north of St. Mary's River and east of Luke Creek.

The formation in the immediate vicinity is composed of an igneous rock, probably diorite, cutting which is a vein 3 feet wide, having a dip of 75° to N.W. and striking N. 75° E. There are three shafts on the property sunk respectively 40, 30 and 20 feet. The 40-foot shaft has the best showing, but the others are similar in many ways, the vein-matter being calcite and quartz, seemingly in alternating layers of varying thickness. In the upper 10 feet of this shaft a fair showing of galena was exposed, but at this depth that mineral disappeared and the shaft was barren until a depth of about 20 feet was attained. At this point copper pyrites appeared on the sides, continuing in small quantities through the vein to the bottom of the shaft, while in the lower few feet a little grey copper was putting in an appearance.

Situated next to the *Black Hills* mineral claim and owned by the same parties.

The country is so covered by soil it is difficult to get at the country rock formation, save as exposed in workings. On this property the formation seems to be a schist on both foot and hanging walls as exposed in a 20-foot shaft. The vein exposed, and on which the shaft is sunk, is from 3 to 5 feet wide, with strike S. 45° E. and a dip of 70° to N.W., the vein-matter being a mixture of quartz and calcite. Scattered through the vein-matter are small bunches and stringers of copper pyrites, but development has not been as yet sufficient to prove in what quantity the ore may be expected.

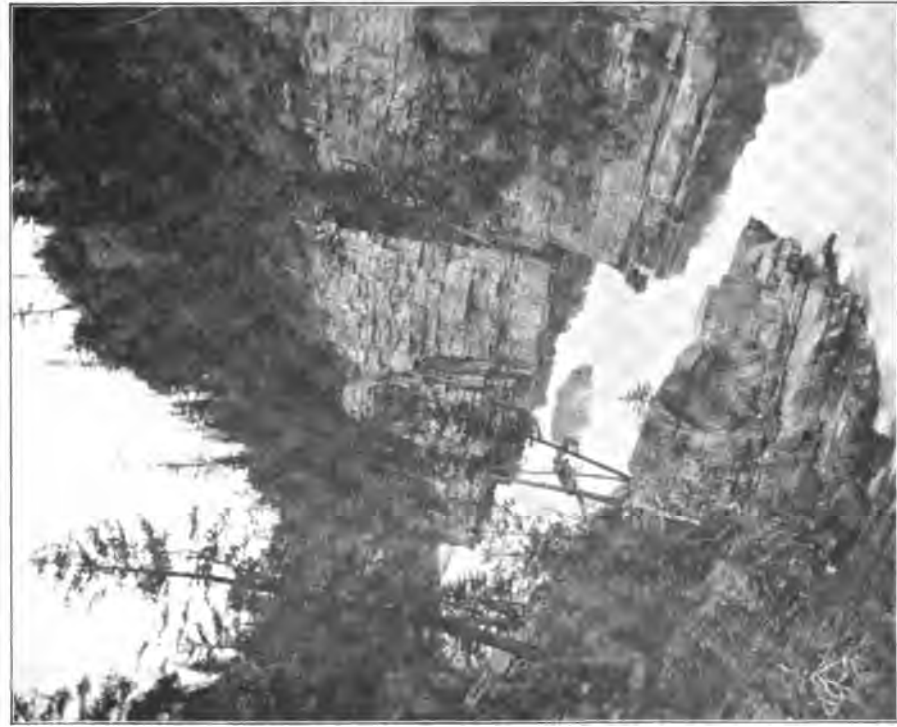
Title, location. Owners, J. Angus, W. Tarrant, and J. T. Laidlaw.

"B. C." Development consists of an open cut 30 feet long by 4 feet deep, with a pit some 10 feet deeper, in which there is shown up two or three small quartz and calcite veins carrying a small percentage of copper pyrites. The vein is nearly vertical and has a strike about N. 55° W.

Same owners as above claims. There is shown up in a small pit, about 5 feet deep, a fairly well-defined quartz and calcite vein, some 5 feet across, dipping vertically and with strike N. 60° W. The country rock is of igneous origin, probably diorite. Some patches of copper pyrites are in evidence, but development is not such as to show what may be expected.

Same owners. Country rock and general conditions are the same as in the above claim, with a quartz calcite vein, 18 inches wide, carrying a small percentage of copper pyrites. While the property has some promise, little can be assured from the development work, which consists of a pit, 8 feet deep. The ore, such as there was exposed of it, was of good quality. A specially selected specimen is said to have assayed 34 % copper, 60 oz. silver, and \$22 in gold. I took no samples, as I did not consider the development sufficient to warrant it.

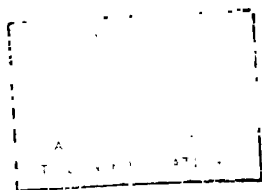
Title, location. Owners on record, Jesse Hutcheson, Michael O'Brien, et al. Cranbrook P.O. The country rock is probably a diorite, cutting which is a fairly well-defined quartz-calcite vein of some 24 inches in width, running E. and W. and dipping north (mag.) at angle of 58°. The development work consists of a 15-foot shaft, but the ground, so far, seems to be much broken, and it is a question whether solid formation has as yet been reached.



BULL RIVER CANYON—S. E. K.



DIVIDE BETWEEN BULL RIVER AND WILD HORSE, S. E. K.  
ELEVATION, 9,000 FEET.



Overlaying the vein is an "iron capping," and the vein-matter carries quite a fair amount of iron pyrites and occasionally some galena. The indications, so far, are promising, but so little work has been done on the property that it is impossible to form any idea of its value.

Owner on record, Geo. Bryant; but I was informed on the ground that the property belonged to Needham & Wolfram, of Vancouver. The general conditions are the same as in the *St. Mary's*, with a quartz and calcite vein of some 18 inches in width, carrying copper pyrites in small quantities. The vein appears to have a strike about N. 60° W. Mineralization does not seem to be confined to the vein, but is shown to a slight extent in the country rock in the immediate vicinity of the vein. There has been a 20-foot shaft sunk in the earth and wash laying up against one side of the vein, and only a skimming has been taken off the side of the vein. The work done is not of a class to develop anything, being little more than a hole in the ground, consequently nothing has been shown to indicate the value of the property.

Title, location. Owners, H. L. Vanwycke, *et al.*, situated on the north side, and near the summit of the low range of hills lying north of *St. Mary's Prairie*. In this claim there is exposed an 18-inch quartz vein, cropping along the hillside in a nearly horizontal line about north and south, and having a dip of 45° to E. The foot-wall seems to be a quartzite and the hanging wall an igneous rock, probably the diorite which is found just south in other claims, but of lighter colour. In an inclined shaft sunk on the vein, and now down some 10 feet, there are exposed some beautiful bunches of azurite and grey copper, which at the outcrop were in considerable quantity, but the quantity seems to diminish with depth. A couple more openings have been made on the outcrop, and here also the ore is less in evidence further down, yet the depth attained is so slight that not much can be decided from it. Undoubtedly there is some very high grade copper ore, carrying silver and gold, but the quantity has yet to be determined. The prospect is one of considerable promise, and it is to be hoped development will be pushed on it.

A location on the west side of Luke Creek, about half a mile above the Government waggon road, owned by S. D. Pompelly. The country rock is limestone, cut by large igneous dykes. The cooling cracks in the dykes have been filled with calcite, which carries galena with sulphides of zinc and iron, sulphides of copper replacing the galena in places. The ore is of good quality, but has not as yet been found in quantity to justify working. The development consists of a large open pit, 6 to 8 feet deep, and a shaft, said to be 55 feet deep, with short drifts from the bottom. The shaft was partly filled with water at the time of my visit, and I was unable to make a personal examination of it.

A fractional location, next to the *Carrie Lee*, and owned by S. E. Pompelly. Here, in an 8-foot pit, near the creek bank, there is exposed, cutting the limestone, a 20-inch quartz vein, intersected by stringers of calcite and carrying copper pyrites and carbonates, from which some good pieces of ore have been obtained. The development has not been sufficient to warrant me in forming an opinion as to the value of the property.

A location on *St. Mary's Prairie* near Luke Creek, owned by Robert Reid *et al.* A small quartz vein has been disclosed cutting the limestone and carrying a small percentage of iron pyrites. The country rock in its immediate vicinity seems to be mineralized in the same way.

A location about a mile and a-half above the Government road crossing of Luke Creek, and owned by S. D. Pompelly. Elevation, 3,250 feet. In a 9-foot pit sunk in diorite there is exposed a calcite vein running with the dyke almost north and south. The vein carries copper pyrites near the surface, but does not show any in the lower five feet of the pit.

Sarah Edith  
Mineral Claim.

Elevation, 3,400 feet. A location on St. Mary's Prairie, near Luke Creek, owned by Reid, Turcotte and others. In a 35-foot shaft there is exposed a quartz and calcite vein, cutting through the igneous rocks, running due east and west (mag.), and dipping vertically. At the surface the vein is 8 to 10 feet wide, in the lower portion of shaft, 3 to 5 feet wide. Some three or four tons of coarse-grained galena were on the dump, derived evidently from the upper fifteen feet of the shaft, where mineralization was most marked.

Carbonate  
Mineral Claim.

Elevation, 3,250 feet. A location near Luke Creek owned by F. P. Norbury, H. W. Barnes and others. A quartz calcite vein, 24 inches wide, of considerable strength cuts the igneous country rock, running N. 30° W., and dipping 70° S. There is a 20-foot shaft on the vein, from which has been taken a quantity of fine-grained galena.

Lottie Mineral  
Claim.

#### MARK CREEK.

Title, location. Owners, Wm. Robertson and Frank Tracy. Situated on the west side of Mark Creek, about one mile above the bridge, on St. Mary's waggon road. The country rock is a syenite, rising in a low, flat hill some little distance back from the creek. There are two fairly well-defined 24-inch quartz veins on the property, dipping N. 45° W. into the hill. The lower vein dips at an angle of about 45°, and on this a shaft has been sunk about 60 feet in depth. Some 200 feet further up the face of the hill is the second vein, dipping in the same direction, but at an angle of 60°. On this a 10-foot shaft has been sunk. Scattered through the quartz of the veins are small pockets and stringers of copper and iron sulphides, but not showing up, as far as I could see, at any point in sufficient quantity to be of value.

Title, location. Owners, W. H. Brown and W. H. Cruger, situated on the west side of Mark Creek above the bridge. The country rock is here a semi-crystalline limestone with strike about N. 40° W., in which is interbedded a vein dipping vertically with a calcite gangue, and in which the discovery was made. This vein is cut by a small quartz vein of no great strength, frozen to the walls of country rock, but free when it cuts the calcite vein, at which juncture it carries copper pyrites in very fair-sized masses but, as far as I could see, only near the surface. There is on the property a shaft about 25 feet deep, and a small open cut.

Josephine  
Fraction.

#### NORTH STAR HILL.

This comprises the *North Star*, *O. K.*, *Dreadnaught*, *Buck Horn* and *Midnight*, all Crown-granted, and a number of full-sized and fractional locations. It is owned by the North Star Mining Co., Limited, of Montreal; President, D. D. Mann; Secretary, H. S. Holt, Montreal; Business Manager and Agent, N M Curran, Fort Steele, B. C. Particulars as to these properties were given in the Report of this Department for 1896, to which little need be added.

North Star  
Group.

Up to the present the same mode of transportation there referred to has been in use, but surveys have already been made for a branch railway connecting the line of the Canadian Pacific Railway between Cranbrook and Fort Steele with the town of Kimberley, on Mark Creek, at the foot of the North Star Hill. From the terminus of this branch, construction of which will be begun sometime during the coming year, it is expected, a tram line will be run to the mine, thereby materially reducing the costs of transportation of ore and supplies, which now so seriously reduce the profits on the ore.

The assay value of the ore shipped this season, as given me by Mr. Curran, averaged 50 oz. silver and 50% of lead, figures exactly corresponding with the official returns for 1897.

No ore has been mined during the present year, except such as was taken out in development work. Shipments have been continued from the stock pile at the "Landing," on the Kootenay River, proceeding thence by steamer to Jennings, and then on to Great Falls, Mont., by rail. Mr. Curran estimates that about 8,000 tons have been shipped to the Landing to date.

The Company has maintained all this year a small force of 12 to 15 men on development work, but has made no important addition to its plant.

To the north of the ore body, and on the general strike of the same, a prospecting shaft was being sunk on a body of iron oxide containing masses of galena. At a depth of some 50 feet a drift had been set off to the south for some 20 feet in the same mass of oxide, which here seemed to be bounded by walls that had a more defined appearance than I was able to note elsewhere.

The main ore body has been left standing waiting for better transportation facilities, and the development has been made with the expectation of proving the existence of an extension of the main ore body to the north and to the east. The prospects were favourable at the time of my visit, July 5, but such extension had not then been found.

The *Midnight* is a property the Company has acquired since the last Report, and lies to the north of and adjoining the present workings. Some prospecting shafts, etc., have been sunk on this property, which have shown up bodies of iron oxides containing masses of galena, but no solid ore has been yet encountered.

Owned by the North Star Mining Co. and — Wade. Situated on Stemwinder the steep south bank of Mark Creek, nearly in a line between the *North Mineral Claim*. *Star Mine* and the *Sullivan Group*, extending from a stake in the creek bottom up the hill towards the *North Star* mineral claim workings.

There is a tunnel on the property which is 150 to 200 feet above the level of the creek, and had been driven in some 50 feet at the time of my visit, July 6. It cuts through beds or layers of dark iron sulphides and oxides, principally the latter, which seem to be dipping N. 30° E. at angle 45°, which would make the strike nearly parallel to the creek at this point. The tunnel runs (mag.) N. and S., and is therefore about 30° from line of dip of the iron layers. About two-thirds of its way in to face there is a layer of soft red iron oxide, while in the face of tunnel, in the lower right-hand corner, there had just been exposed a layer of very soft, loose material, chiefly iron oxides, but seemingly carrying some lead carbonates, which assayed \$1.00 in gold and  $\frac{3}{16}$  oz. silver. The tunnel stops here without showing what this layer may contain further in.

Consisting of the *Dean* and *All Over*, both Crown-granted, and the *Dean Group*. *Gold Bug* and *Silver Bug Fractions*, both locations. Owned by R. O. Jennings, C. D. Porter, *et al*, of Fort Steele. Situated on North Star Hill, in the immediate neighbourhood of the *North Star Mine*.

The general country rock seems to be the same as, and the conditions similar to, those in the *North Star*, excepting that, so far, no galena to amount to anything has been found in place. In several places there is an "iron capping" resembling a true "gossan," and embedded in it there have been found boulders of galena. In one or two places there have been exposed stringers of mineral, sometimes in quartz, consisting chiefly of iron sulphides, with occasionally a little galena. No development, however, has so far succeeded in tracing these stringers to any ore body.

From the position of the *Dean*, relative to the *North Star*, it would appear that the ore body of the latter, if it continued, should partly enter into *Dean* ground, but serious development work has failed to discover any such extension as yet.

On these properties there has been sunk one shaft 50 feet, two shafts 22 feet each, and one 20 feet, together with other smaller shafts and a large number of open cuts. Work was still in progress at the time of my visit, and some four men were employed under the management of Mr. R. O. Jennings.

Consisting of three claims, all Crown-granted, *Hamlet*, *Hope* and *Shy-Sullivan Group*. *lock*. Originally located by Pat Sullivan, Jno. Cleaver, E. C. Smith and W. C. Burchett; now held by the Sullivan Group Mining Company, of which F. P. Hogan, of Spokane, Wash., is president, Chas. Wolf, treasurer, and F. L. Williams, secretary. Situated on the north-east side of Mark Creek, on what is known as Sullivan Hill, about one and a-half miles north of the *North Star*, and the same distance from the projected town of Kimberley, at the foot of the North Star Hill.

At the time of my visit, on July 4, every pit was full of water and I could not, therefore, form any very definite opinion of the group from my own observations. My conclusions have been largely based on information given me on the ground by Mr. E. C. Smith, one of the original locators. Considerable prospecting work has been done on these three claims, as already fully described in the Report of the Department for 1896, and galena and iron have been found in various places. When the property was taken over by the present company the body of solid galena exposed in the *Hamlet* was the most promising, and on this there has been sunk a prospecting shaft, said to be down 30 feet in solid ore.

The company sank a 5 by 9 working shaft dipping 70° to the west at a point distant some 50 feet from the old prospecting shaft, and which was supposed to be to the dip from the exposure of the ore body. This shaft, I am told by Mr. Smith, passed through some 20 feet of solid ore when the solid ore ceased. After being driven some 30 feet farther in country rock the work was, for the time being, abandoned by the company. Further prospecting was then begun by Mr. Smith, and an open cut was made running east and west, about 75 feet to the north of the shaft. This cut, although partly filled with water, I was able to examine. A very little stripping revealed a mass of iron oxide, below which lay a mass of iron sulphides and galena, while at a depth of 8 or 10 feet the iron had been largely replaced by almost solid fine-grained galena, which showed up in the cut for a width of some 20 feet. I could see no wall or anything to indicate a vein, and could not decide as to the nature of the deposit from the amount of development done. It looked as if the ore body was dipping to the east, i.e. down the hill, at rather a flat angle. If these indications prove correct it will, to some extent, explain why the shaft, with a dip to the west, ran out of ore, that is, only cross-cut the ore body. I cannot agree with the idea advanced that the ore in this cut is a new discovery, but am of the opinion that it is the same ore body that had been struck in both the discovery and working shafts.

I took what was an approximate average sample of the ore in the cut, and my assay showed lead, 43.36%; silver, 17.5 oz.; gold, trace.

Mr. Smith was on the ground with men preparing to unwater the cut and go ahead with further development. He expected to have a pump and other machinery on the ground this summer, when an attempt will be made to prove the extent of the ore body, which promises so well for the small amount of work done. The property has great advantages in the way of transportation, being so near the North Star waggon road, which is a public road; and if the projected railway from the Canadian Pacific Railway to Kimberley becomes a fact, the mine will be within two miles, by easy grade, of railway transportation.

Situated on the north bank of Mark Creek, nearly in line between the  
**Goodey** *North Star and Sullivan Groups.* Location; owned by Dave Newell, C.  
**Mineral Claim.** C. Farrell, *et al.* In the steep rock cliff forming the bank of the Creek there was exposed a rather poorly-defined quartz vein some 24 inches wide, containing a small percentage of copper, as bornite and pyrites, together with a little grey copper. Through the quartz were small cavities filled with calcite. From the outcrop and following the lead a tunnel has been driven in about 20 feet. It was explained to me by one of the owners that this was being driven to strike a contact "between the syenite, in which the vein occurs, and a dyke of more recent igneous rock, probably a diorite," which contact, it was expected, would be reached in about 40 or 50 feet. The "diorite" could be seen on the steep side of the cliff, a little higher up the creek, in contact with the syenite, the line of contact running about N. 45° W. and into the creek, at which point it is said to carry mineral. I could not get to the point, however, as the water in the creek was too high at this season of the year.

#### ALKI OR JOHN CREEK.

A small creek flowing into the upper end of St. Mary's Lake from the north.

From Fort Steele and Cranbrook a good waggon road extends up the St. Mary's River as far as Matthew Creek, a distance of some 25 miles, from which point the mouth of Alki Creek is reached by a good Government trail, which continues on over the summit to Pilot Bay, in West Kootenay, and is much travelled in the latter part of the summer. From October to July continuous snow on the summit renders it almost impracticable. The trail up Alki Creek from its mouth is a private trail and was found in poor condition and very steep.

Elevation, 5,300 feet. Situated on the east bank of the creek, and  
**Maud** owned by C. H. Pollen, of Nelson. A tunnel had been driven into the  
**Mineral Claim.** wash in the hillside, composed of water-worn boulders and clay. At the time of my visit, August 1, the tunnel was in some 15 feet, and still in the wash.

Situated on the west side of the creek some three miles from its  
**Blue Peter** mouth. At an elevation of 5,450 feet, a lower tunnel has been driven in  
**Mineral Claim.** some 25 feet in wash, with the evident intention of reaching the outcrop of the quartz ledge developed by the upper tunnel. On August 1st the tunnel was still in the wash, but a number of boulders, about 6 inches in diameter, of copper pyrites were being encountered. The country rock is quartzite, laying flat, cut by strong igneous dykes.

The upper tunnel (elevation 5,525 feet) has been driven in for 45 feet along the south side of a quartz ledge running nearly east and west, and then makes a right angle turn to the north, cross-cutting the quartz vein, at this point 12 to 15 feet wide. The quartz carried copper pyrites scattered through it in bunches in very appreciable quantities, the showing in



the tunnel giving promise of a good concentrating ore. Selected sample is said to have assayed: copper, 14 %; silver, 6 oz.; gold, \$3. The ledge is traceable up the hill from the tunnel for 100 or 150 feet, and is accompanied by an iron capping. At this point the main ledge is cut by a smaller quartz ledge, running north and south, and could not be further traced by me. The smaller ledge has not been developed to any extent. The four men at work on the property were living in tents, no cabins having yet been built.

In the basins at the head of Alki and Matthew Creeks and on the  
 Capt. Petty's dividing summit, Captain Petty, representing the Selkirk Mother Lode  
 Claims. Copper Mines, Ltd., and R. W. Western, *et al*, has had a force of 18 men  
 at work since about July 1st—the only organized prospecting party in  
 East Kootenay, where the work is directed by one man and carried out by ordinary paid  
 labour. The party were camped in tents in the Alki basin, where was also situated the  
 blacksmith shop and store. The men boarded themselves and went from camp to their work  
 daily, in some cases a walk of an hour and a half, carrying their steel with them.

The Selkirk Mother Lode Copper Mines, Ltd., is working on the *J. K.*, *Glenora*, *Hilda*,  
*Golden Chief* and *Ragland*, all apparently on the same lead, running S. 65° E., a lead some  
 50 feet across where measureable, and seeming to be at the contact of a large igneous dyke  
 with the quartzites, etc., of country rock. In places the quartz is heavily mineralized with  
 arsenical iron and copper and iron pyrites. At the time of my visit the claims had only been  
 opened up about a month, and the little work done on each did not serve to prove the value of  
 any of the properties. The work done was in the nature of assessment to cover all the claims,  
 the purpose being to later develop the most promising.

The tunnel in the *Golden Chief* is on the outcrop of the lead and in some 20 feet. A  
 shaft has been started on the *Hilda* and was down 10 feet, the intention being to continue it  
 until it cut across the lead. Work on the *Glenora* (elevation 7,550 feet) consists of a 20-foot  
 tunnel on the outcrop, and was similar to that in the *Golden Chief*, and the *J. K.* (elevation  
 7,830 feet), showed strong mineralization in an inclined shaft started on the quartz lead and  
 down some ten feet.

R. W. Western *et al* have located the *Parparea*, *Elise*, *Swift*, *Toodles*, *Buttons* and  
*Charlie K.*, but enough work has not as yet been done to show up anything. These claims lie  
 alongside the S. M. L. C. M.'s properties, but are on a different lead.

Captain Petty, I was informed, was working a force of 12 or 14 men near the head of  
 Copper Creek, at the *Pyramid Group*, but as the force had only been in a short while doing  
 assessment work, and the Camp had been reported on in last year's Report, I did not feel it  
 imperative to spare the two or three days necessary to inspect it.

Situated on the mountain some 700 feet above St. Mary's Meadows, at  
 "1900" Mineral an elevation of 4,100 feet. The lower tunnel, which is in some 8 feet, has  
 Claim. a very fair showing of coarse grained galena occurring in quartz. I was  
 unable, however, to trace any definite vein, or anything to indicate a  
 continuous ore body. Locally, the country rock is very much broken and appears as if it had  
 moved down the mountain.

Held by Karl Neitzel *et al*, and situated above St. Mary's Meadows.  
 Lake View There is here a quartz vein 3 inches wide exposed in the side of a cliff at  
 Mineral Claim. an elevation of 4,350 feet. The vein is exposed in a small open cut, and  
 the quartz is slightly mineralized with iron sulphides.

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WILD HORSE CREEK.

*McMillan's Placer Claim*, a placer lease on the east side of Wild Placer Mining. Horse Creek, slightly below and on the opposite side of the creek from the mouth of Brewery Creek, and below the *Nip and Tuck* hydraulic property. The claim is being worked by J. McMillan and Eric Bergren, in association with N. A. Wallinger, of Fort Steele.

The owners, believing in the existence of an "old channel," are making a very determined and plucky attempt to prove the theory that a gigantic slide has occurred on the mountain side whereby the old channel of Wild Horse has been filled up and the river forced into its new and present channel, commencing at a point near the lower end of the *Nip and Tuck* property. Having driven several short tunnels and sunk prospecting pits from which to obtain data, they are driving a tunnel near the present bed of the creek, now in some 160 feet, to cut what is supposed to be the western rim rock of the old channel, and according to their calculations should be nearly through it.

Their theory as to the existence of an old channel seems to be based on good reasoning and to be supported by the facts so far as known. The venture is, of course, a risky one, for even should the theory be found to be correct, it will still remain to be proved whether at this point the old channel carries value. On this point, however, the presumption is in their favour. The bed of Wild Horse, for some miles above Brewery Creek, has produced very large quantities of placer gold, estimated at \$20,000,000, and has been the scene of successful placer operations since the early "60's," and is still a producer to a limited extent. The records of the past show that the "pay" stopped at just about the point where the old channel is supposed to have taken off. Below this point the present channel has proved barren.

The work has all been done in such good shape—more particularly the timbering in the tunnels driven in difficult ground for prospecting purposes only—that it is evident the men are expert placer miners, and are experienced in this particular work. This fact inspires confidence in their theory. The plucky way in which they are putting in hard and honest work—their own time for years—asking no one's assistance, shows that the spirit of the old-time placer miner is not yet dead. Few men in the District where pretended development work is not uncommon will, I think, grudge to this honest though problematic endeavour any and all success that may attend it.

There are three companies now working by hydraulics the gravel banks Hydraulic Mining. of Wild Horse Creek. The Nip and Tuck Gold Hydraulic Mining Co., of London, Eng., is operating a property on the east bank held as a Crown grant. It is working a bank about 50 feet high, of which the upper 20 feet is loam, sand, etc., carrying very low values. The lower stratum is a blue boulder clay, laying on a bed-rock of chloritic slates, standing at an angle of 65°. The operations were being conducted under the superintendency of Mr. Buckstone, who was employing eight men, and it was expected that 150,000 cubic yards would be the season's work, the season lasting from April to September. A 6-inch Giant was at work under a pressure of 200 feet head, together with a couple of ground sluices, the water for which was being taken from the creek, about five miles above, and brought down by a hill-side ditch. A portion of the ground has been sub-let to a company of Chinese, who were working in a small way with a canvas pipe and a 2-inch nozzle.

The Invicta Gold Mining Company is operating a mile of property on the west side of Wild Horse Creek under lease, the work being under the management of Mr. J. W. R. Young, M. E. An extensive plant is on the ground, described in the Report of the Department for 1896, and the company is preparing to erect an hydraulic elevator for removing the

gravel from the lower levels of the bench, which is expected to be in working order for next season's operations. No washing has been done on the property this past year.

The Chinese Hydraulic Company, Quong Young Tong Company, has a lease of about a mile of river bank just above the Nip and Tuck ground, and has removed considerable dirt this past season. I have been unable, however, to secure returns as to the value of the wash-up. They are rather imperfectly fitted as to piping, etc., and are using canvas hose with a small nozzle, but are reported to be doing good work.

Situated on Lone Mountain, about four miles from Fort Steele, at an elevation of 3,500 feet. Owned by D. Studtlander and D. Hunter, of Fort Maple Leaf Mineral Claim. Steele. Reached by a rather indefinite trail, but over a country through which a trail could easily be made. The country rock is composed of quartzites, overlaid by a crystalline limestone dipping N. 25° W. at an angle of 40°. There is exposed in a 30-foot tunnel a 24-inch vein, striking N. 30° E., and dipping N. 60° W. at an angle of 70°. The tunnel is near the junction of the quartzites and limestone, and the vein seems to be continuous in both rocks. It is composed of alternating layers of quartz and calcite, while on the hanging wall there is a layer of some 3 inches of iron oxide. The vein is more or less mineralized with iron sulphides, and an average sample is said to have given a value of \$7 in gold.

A location, owned by W. Voss *et al.*, of Fort Steele, situated on the Kootenay King mountains on the west side of Wild Horse Creek, to the south of Victoria Mineral Claim. Gulch. The country rock is composed of shales, quartzites, etc., dipping N. 50° E., at an angle of 65°. The first tunnel, elevation 6,650 feet, driven in 25 feet, shows only slight mineralization. A second tunnel, elevation 6,750 feet, driven across the measures due west for 120 feet, cuts several porphyry dykes, all more or less decomposed and containing only slight values in silver and copper. A third tunnel, elevation 6,850 feet, driven due west for 80 feet, shows no ore in place, so far as I could see, but on the dump was a quantity of sandy shale, heavily impregnated with galena.

In a gulch, some 150 feet above the last mentioned tunnel, there outcropped a small quartz vein, 5 inches thick, cutting the quartzites, but seeming to dip under the next bed of slate. This small vein was heavily charged with galena, say 3 or 4 inches solid, with some grey copper, and carried good silver values. No development work has been done on this lead, although I am told that samples giving high assays and credited to the property have been taken from this outcropping.

Situated on Victoria Gulch, at an elevation of 4,500 feet, and owned by W. Voss *et al.* Two tunnels have been driven in on a quartz ledge carrying galena and grey copper, but not yet in quantity to be profitably worked.

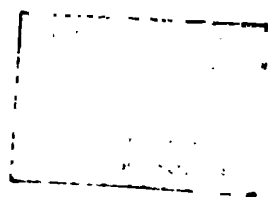
Situated on the south-east side of Wild Horse Creek, opposite a point about a mile below the mouth of Victoria Gulch. Elevation 6,250 feet above sea level, or 3,500 feet above the creek bottom. This property is better known in East Kootenay as the *Lily May*, under which name it achieved some notoriety, having been floated as a company in the United States for a very large amount—\$600,000, it is reported. Some omission vitiating the registration of the company, it was re-located by A. J. Robertson as the *Glad Surprise*, the *Lily May* owners being "left out in the cold." A legal flaw, however, was found in Robertson's title, said to be the lapsing of his free miner's certificate, and the property was again re-located by Dave Griffith, one of the *Lily May* shareholders, who, not inappropriately, gave it its present name.



DARDANELLES ARRASTRA—WILD HORSE CREEK.



MOYIE CITY—S. E. KOOTENAY— FROM ACROSS THE LAKE.



The country rock is composed of shales, quartzites and talcose schists, dipping N. 65° W., at an angle of 55°, and in the immediate vicinity of the vein there are several small igneous dykes crossing the measures and the vein at right angles and nearly vertical.

The vein is quartz some 12 to 18 inches thick, dipping N. 65° E., at an angle of 25°, into the hill, cutting the measures nearly at right angles, the outcrop being traceable along the hillside, nearly horizontal. The vein seems to be free on the hanging but frozen on the foot-wall. On this outcrop considerable work has been done. Starting at the most south-easterly opening not far from the south-east side of the property, an inclined shaft has been run on the vein, but exactly how far I could not learn. I was down some 40 feet from the surface, but water in the shaft prevented further examination. The vein shows all the way down to this point, but is only slightly mineralized. There are also two or three surface strippings on the outcrop. A second incline has been driven about 35 feet, showing a quartz vein 18 inches thick, with some galena and iron sulphides. Tracing the outcrop along the precipitous face of the cliff, I again came to still another incline driven down 15 or 20 feet, and at present used as a blacksmith shop. The vein here is more or less broken by a dyke almost 24 inches wide, and shows a somewhat stronger mineralization, galena and iron sulphides. About 40 feet north-west of this point there is a fault which appeared to cut off the vein. It is said to have been traced farther, but I could not again find it.

The quartz is reported to have yielded many samples containing free gold, and I have been shown such samples said to have been taken from the property. A diligent search failed to reveal any such gold quartz in place. From the general conditions I am of the opinion that the vein, such as it is, will not hold with depth, and my samples failed to show the gold values claimed for the property. I must admit, however, that small samples of a gold property are not conclusive.

Situated on the south-east side of Wild Horse Creek, almost opposite the mouth of Victoria Gulch, which lies about ten miles from Fort Steele  
**Dardanelles**  
**Mineral Claim.**

and is reached by a good waggon road following the valley of the creek. Owned by Banks Bros., of Fort Steele. There exists a very fair trail leading from the Arrastra, on the creek, direct to the mouth of the tunnel. The horizontal length of this trail is said to be, from actual measurement, about a mile and a half, while the elevation of the tunnel above the creek is some 2,200 feet. In the fall of 1896, 30 tons of ore were hauled down over this trail on a "go-devil"—practically a sled with spikes in the bottom to prevent too rapid a descent. The ordinary load was said to be three tons in sacks, and but one horse was employed; the empty sled being turned "spikes up" for the up haul.

The country rock is composed of shales, slates, schists, and beds of quartzite, the shales forming the greater part of the mountain. In the working tunnel the shales seem to be somewhat distorted, but the disturbance appears to have been more or less local, judging from surface indications. The surface, however, is heavily covered with rock slide, rendering observation difficult. On the trail, at an elevation of 4,850 feet, the measures seem fairly regular, with a strike of about S. 45° E., and a dip of 55° to S. W.

At an elevation of 5,700 feet, and exposed in several shallow cuts on the side-hill, there is a quartz vein, outcropping in a nearly horizontal line, striking nearly east and west and dipping into the hill. An inclined shaft has been sunk on the vein for some 175 feet, the first 125 feet being at a dip of 20°, while the last 50 feet dips at an angle of about 35°. As exposed in the incline, the vein has a thickness of about 3 feet at the surface, widening out to 4 feet and then diminishing to 12 inches at a point about 125 feet from the surface. Here the vein seems to split, one portion apparently going into the roof, the shaft following the other

for some 50 feet, in which distance the vein has pinched out to 3 inches. To determine whether the vein had in fact split, an uprise was driven into the hanging wall at the point mentioned, but it failed to disclose any such spur going farther than a few feet.

The shaft was in a very dangerous condition, the shales showing an inclination to slack. No sufficient timbering had been done, and the roof was falling in many places. At about 50 feet down the incline the measures were cracked, indicating a sliding of the whole face of the hill. At this point the roof of the incline was covered with icicles, which were apparently forming and not melting, despite the fact that it was one of the warmest days of summer without, and that near the bottom of the incline it was comparatively warm.

Judging from exposures on the sides there must have been some good ore taken from the incline, consisting of galena with grey copper, and copper as carbonates and pyrites, said to contain good values in silver and gold. It was supposed that the quartz carried considerable free gold, but I doubt if such existed to any extent. The ore seems to have been confined chiefly to the first 40 feet of the incline, not showing below that point in any quantity, although there is more or less mineralization all the way down. The surface indications were so good that it is to be regretted that no serious development work has been done at any other point on the outcrop. At present, at the points exposed to view, the ore does not continue to a depth to make a mine.

There is a good cabin on the property, but in summer it is a mile or more to drinking water.

In 1896 the owners of the above mine built an arrastra on the bank The Dardanelles of Wild Horse Creek, at the bottom of the trail from the mine, for the Arrastra. purpose of working their ore. On trial it was found that the ores were unsuited to such treatment, and although a number of tons were treated the venture was not a success, and the clean-up did not give any returns. The pulp was ground to almost a 20 mesh nominally, but the screens seem to have been defective.

As a piece of construction the arrastra is very creditable, and shows what can be done in a locality where the machinery must be made on the spot, and of the timber found at hand. The arrastra itself is a tight, wooden, circular tank 9 feet in diameter and 30 inches deep, bound with iron bands. The wooden bottom is paved over with large stones tightly wedged in. In the centre of the tank is a vertical 12 by 12 inches wooden shaft set in a suitable step-bearing and provided with four wooden arms, to each of which there is attached, by chains, two stone drags, making eight in all. These drags weigh from 200 to 500 pounds each.

Motion was conveyed to this shaft through a horizontal, wooden gear-wheel, 5 feet in diameter, with wooden teeth which, in turn, connected with a similar but vertical wheel on the main horizontal shaft of 12 by 12-inch timber, on which was hung an overshot water-wheel, 20 feet in diameter, with a 24-inch face and buckets 9 inches deep. The water for driving the wheel was carried from higher up the creek by a 12 by 12-inch overhead box flume. The arrastra is covered with a shed, and connected therewith is a good log assay and living room. The whole is "home-made," and constructed practically of wood, only a few nails and straps of iron being added to the material at hand.

At or near the head of "The South Fork of the East Fork of Wild  
 Coronado Horse"—or Collet Creek, as it has been called—the first creek from the  
 Locations. south on the east fork of Wild Horse, there has been a long string of  
 locations made on what is supposed to be an igneous dyke, cutting the  
 measures in a general direction about magnetic north. Starting at a point on the east side of  
 the basin at the head of Collet Creek, we have in succession, crossing the basin diagonally, the

following locations:—*Colossus*, *Yukon*, *Klondyke*, *Coronado*, *Arena Fraction*, and *Arena*, which reach to the summit of the divide. Still following the same line into the basin at the head of Wallinger Creek, we have then in succession the *Dodo*, *Keystone*, *Neosha*, *Red Mountain*, and *Defender*.

All of these locations are of comparatively recent date, few, if any, being made before the summer of 1897; and as I visited the series on the 16th July, 1898, when the snow had just left the hills but still lay in the basin, very little work other than the yearly assessment had been done on any of the claims.

The country rock, at an elevation of from 7,000 to 8,500 feet, on the summit of the hills to the west of Collet Creek, is dolomitic limestone about 500 feet thick, underlying which is an 100-foot bed of conglomerate, and again underlying this are shales and occasional quartzites. Until these measures approach the very head of the creek, and the divide between Wild Horse and a tributary of Bull River, they are fairly regular, dipping N. 55° W. at an angle of 40°, but on the divide there is evidence of much disturbance in the contorted and broken shales. Except on the precipitous face of the west side of the creek, the surface is heavily covered with wash and broken shale, making prospecting difficult. So little work was done, and the surface was so covered, that I was unable to trace the dykes to my own satisfaction.

There is a fairly good Government trail up Wild Horse Creek as far as the point on the east fork where Collet Creek branches off. Beyond this point, and for the rest of the way, some 3 or four miles, the trail is the work of prospectors and was very imperfect.

These are full locations, owned by Frank C. Collet *et al*, Fort Steele.  
*Colossus*, *Yukon*, They had very little more than surface scratchings to show, and are  
*Klondyke*. situated on a heavily timbered side-hill. On what I take to be *Klondyke*  
ground is a very neat log bunk and mess house.

These lie on the western side of the basin, at an elevation of 7,000  
*Coronado*, *Arena* feet, and are locations belonging to A. Polson *et al*. On the *Coronado* a  
*Fraction*, *Arena*. tunnel was being driven, under contract, for 50 feet, and at the time of my  
visit had been driven 20 feet, in limestone, which showed no mineral of  
value. On the surface, chiefly in the wash, were numerous pieces of copper ore, carbonates,  
and sulphides. In several cases the ore appeared to be in place, but this was not very clearly  
proven. A certain amount of iron gossan also appeared near the surface, but the development  
showed up little of value.

These are locations on the summit of the divide, at an elevation of  
*Dodo*, *Keystone*. 7,800 to 8,000 feet, and are held by Frank C. Collet *et al*, of Fort Steele.  
On the *Dodo* there appears to be a capping of iron oxide, which extends  
pretty well the length of the claim, and probably into the *Keystone* adjoining. On this iron  
capping a small tunnel has been started on the Bull River slope of the hill, but it was only in  
a few feet, and while it showed slight mineralization—chiefly iron and galena—it did not  
prove much beyond the existence of the iron capping.

A location at the very head of and on the east slope of Wallinger  
*Neosha* Creek, at an elevation of 7,550 feet, and owned by K. J. Highby *et al*. of  
*Mineral Claim*. Fort Steele. A tunnel has here been driven in some 35 feet through  
successive layers of iron oxide, supposed to be a capping of gossan. These  
layers seem to run about conformable to the slope of the hill-side, as if the iron had been



brought from some point higher up the hill in solution, perhaps from some spring, and deposited at different times. In the face of the tunnel there was a layer, some 12 inches thick, of pale blue talcose clay, the tunnel not cutting through it. No mineralization was in evidence in the tunnel, excepting the iron oxide.

The *Red Mountain* mineral claim, belonging to Wm. Walsh *et al*, and the *Defender*, belonging to A. Polson *et al*, are extensions on the same belt to the south, but on neither has any serious work been done.

These are locations in the bed of the east fork of Wild Horse Creek, near the junction with the main creek, and extending up the hill on either side. Owners, H. Amme, Van Ardsdale *et al*, Fort Steele.

The discovery was made in the creek bottom, and at this point the development has been done, chiefly on the *Colossal* claim. Some 150 feet of ground sluicing has been done, exposing the ore body, but the high water had caused the bank to cave in, and I could not see anything in the cut. An 80-foot tunnel had also been driven in from the creek bottom, but this also was partly filled with water. I managed, however, to get into this, and could see that in the sides a quantity of iron pyrites was exposed, amounting to from 5 to 10% of the rock near the mouth of the tunnel, and perhaps less as the tunnel went in. From this pyritic ore good values in gold are said to have been obtained. The pyrites occurs in thin layers, about one-eighth of an inch thick, as if deposited from solution.

Although considerable work had been done on these claims, the high water in the spring had so covered it that I was unable to form an accurate opinion of the deposit.

#### SIX-MILE CREEK.

Six-Mile Creek is a small creek flowing in a south-westerly direction from the Rockies, and emptying into the Kootenay River about six miles above Fort Steele. On it a number of locations have been made, but as yet little beyond assessment work is apparent.

This group is composed of two claims, the *Paris* and the *Exhibition*, and work done has been confined to the former. The properties were located by H. Ohlsen and P. Larsen, and are bonded to a Victoria syndicate represented by Mr. Bushby.

As exposed along the trail leading up to the claims the country rock composing the greater part of the mountain seems to be made up, in ascending series, of quartzites, quartz-shales, shales, schists, slates and limestone. The *Paris* property is a location situated about 6 miles up Six-Mile Creek, at an elevation of 6,200 feet, or over 3,500 feet above the valley of the Kootenay. The country rock in the immediate neighbourhood is the limestone usually found in the Rockies at this elevation. Considerable work has been done on the property and several good log cabins erected, the camp being one of the best kept in the District.

*1st Tunnel.* In 35 feet N. 60° E, started on a quartz vein 20 inches wide, which ran in 20 feet when it was cut off. Other smaller veins appeared, but after continuing 10 feet they also were cut off. The quartz carries iron sulphides, in rather irregular patches. Samples taken from the dump are said to give values of \$4.00 in gold.

*2nd Tunnel.* Is about 20 feet vertically above the first tunnel and some 30 feet farther to the south, and on August 9th was in about 175 feet. This tunnel was started on a vein composed of 18 inches of quartz and 15 inches of calcite, which continues in the tunnel for 120 feet, when it bears off to the right at a certain "slip" in the country rock. At the same

point another vein of 24-inch quartz appears in the roof of the tunnel. The first lead was here abandoned and the tunnel follows the second lead for from 30 to 40 feet when a small fault cuts the measures. This seems to have reduced the size of the quartz ledge from 24 to 4 inches, while at the face it is about 3 inches wide.

### TRACY CREEK.

Tracy Creek runs in a south-westerly direction from the Rocky Mountains to a point some ten or twelve miles up the valley of the Kootenay River from Fort Steele, and then disappears underground near the new town of Tracy, in the immediate vicinity of which a number of locations have been made, the majority, as yet, but little developed. A good waggon road connects Tracy with the main Government stage-road from Golden to Fort Steele, at a point near Hanson's; and from Tracy, good trails lead to the various properties on Tracy Lewis and Wasa Creeks.

The town of Tracy is prettily situated on a plateau, at the base of the main range of the Rockies, and consists of some eight or ten houses, a couple of stores and a very comfortable hotel, the "Estella," kept by Albert Mutz, formerly of the "California Brewery," of Butte, Mont.

This group consists of the *Estella*, *Skylark*, *Raven*, *Cashier*, *Alice* and *Estella Group*. *Mountain Daisy*, owned by A. Mutz, Geo. Scott and others, and is bonded to Alex. Polson. The claims are situated on the mountain back of Tracy, two or three miles distant, at an elevation of about 6,000 feet. The country rock is composed of shales and schists.

*Copper Lead.* Work has been chiefly confined to the *Estella*. A quartz vein some four feet wide was exposed in a gulch made by a small stream, the vein dipping directly into the hill at an angle of 30° to the S.E., and the outcrop on the main side-hill being nearly horizontal, striking S. 40° W., and traceable for 2,000 feet on the hillside. On either side of the gulch, on the outcrop of the vein, a tunnel has been run in; that to the N.E. being in 30 feet and the one to the S.W. some 60 feet.

In both of these tunnels was found a very considerable amount of gray copper, together with copper carbonates and some galena; and a number of tons of good copper ore is now on the dump. While the ore is not altogether solid, it amounts to some 40 or 50 per cent. of the vein as exposed in the tunnel.

These tunnels let in so much water that no attempt was made to sink on them, and in order to reach the vein at a greater depth a tunnel was started down the hill-side some 150 feet, vertically, below the upper tunnel and at an elevation of 6,000 feet. The hill here slopes to the north-west, at an angle of 30°, and the dip of the vein is 30° to the south-east, so that the lower tunnel will have to overcome both of these slopes. Should the dip of the vein remain constant, as in the exposure in the upper tunnel, the lower tunnel will have to be driven some 520 to 600 feet before it can be expected to cut the vein. But if the vein should assume a flatter angle the tunnel would have to be driven much farther.

At the time of my visit, August 11th, the lower tunnel was in about 480 feet, and still progressing, the work being done under contract by Martin Anderson, at \$14 per running foot, for a 5 x 7 tunnel.

*Galena Lead.* Some 300 feet above the copper lead already described, there outcrops an igneous dyke apparently, carrying galena, which dips south at an angle of  $50^\circ$ , and has a strike about due E. and W. The outcrop of the galena deposit cuts the outcrop of the copper lead some 500 feet to the south-west of the line of the main tunnel. It seems unfortunate that this tunnel had not followed in the galena, for it would then have cut, eventually, the copper lead at about the same point aimed at now, and thus developed both deposits.

I traced the galena outcropping over the hill for from 500 to 800 feet and found the width, as exposed on the surface, to be from 6 to 24 inches of almost solid galena. Only surface stripping had been done on this deposit, all energies having been confined to the copper lead.

As is evident, little but surface work has been done showing mineral, but from these developments I have great hopes that further success will be met with in the lower tunnels.

### LEWIS CREEK.

A location on Lewis Creek, at an elevation of 3,500 feet, owned by A. St. Lawrence Bain, *et al.* The formation here is chiefly shales, striking S.  $45^\circ$  E. and dipping N.  $45^\circ$  W. A small quartz vein, some 4 inches wide is exposed, striking the same as the country rock, but with a dip N.  $30^\circ$  E., carrying a small amount of copper. Three tunnels have been run. The first, in 25 feet, is not on the vein but it is supposed it will cut it farther in. The second is 300 feet to the north of the first tunnel, at an elevation 3,600 feet, and was in some 25 to 30 feet in wash. Above it, from 25 to 30 feet, are two so-called "iron chimneys" about 12 feet high, composed of fragments of country rock cemented together with iron and lime. The third tunnel was in some 10 feet, assessment work only. Above this last-mentioned tunnel some 50 feet, there is an outcropping of what appears to be a 24-inch quartz ledge, but no work has been done on it. Where it outcrops it is barren.

Is a location staked by Wm. Pfeifer, and appears to be on St. Lawrence ground. Development consists of an open cut, run in some five feet in a mass of rock slide, which is cemented with iron and lime.

A location near Lewis Creek, owned by J. Conklin, *et al.*, and reported to be under bond to the Fort Steele Development Company (Limited). On this property there is exposed in a small open cut a quartz vein some 6 to 8 feet wide, somewhat broken and laying between a black slate and a mass of igneous rock, and dipping N.  $15^\circ$  W., at an angle of  $40^\circ$ . Near the surface the vein shows galena in stringers. There is in addition to the open cut a tunnel in some 5 feet, also showing galena. With such slight development little can be said of the property. Surface indications are, however, favourable.

The *Minnie* mineral claim lies above and adjoining the *Tiger*, and probably is on the same lead. It is a location owned by J. W. Arthur, and little work beyond one assessment has been done on it.

### WASA CREEK.

This group consists of two locations, the *Wasa* and the *Mammoth*, *Wasa Group*. owned by Wm. Thompson *et al.*, of Fort Steele, and is situated on Wasa Creek, a tributary of Wolf Creek. At an elevation of 4,650 feet a tunnel has been run in from the outcrop on the vein and parallel with the strike, for a distance of 75 feet. The vein, as here exposed, is of quartz, some 2 feet thick, laying on the top of a black slate and underlaying a white schistose limestone dipping in the tunnel at an angle of 10° to 15°. Between the slate and the quartz there is a parting of red oxide of iron, carrying no values, from 2 to 4 inches thick in places.

There is a pile of several tons of ore on the dump composed of gray copper, copper carbonates and oxides from which are said to have been obtained assays of 22 per cent. copper, 110 oz. silver, and \$10 gold, but this is higher than would be the average. At the face of the tunnel there was ore showing, but not as yet in quantity to be profitably worked.

At places on the outcrop the quartz lead is said to be very much wider than the two feet mentioned, and is given a width of over 25 feet in certain points. As night was coming on and I had to return over a rather bad trail, I could not get to see these outcrops on which very little work had evidently been done.

### THE FOLLOWING IS THE REPORT OF J. F. ARMSTRONG, GOLD COMMISSIONER FOR THE FORT STEELE DIVISION.

I have the honour to report as to the progress of mining for the current year. The office statistics are as follows :—

Free Miners' Certificates issued .....	795
"                    substituted .....	4
Mineral Claims recorded .....	669
"                    partnership .....	4
Placer Claims recorded .....	13
"                    partnership .....	9
Certificates of work issued .....	741
Certificates of Improvement issued .....	27
Mining Leases issued .....	15
"                    in force .....	20
Entries in Records of Conveyances .....	361
"          Record books .....	766
"          Records of Water Grants .....	16
"          Records of Abandonments .....	8
Number of Affidavits filed .....	1,237
"          other documents filed .....	213
Mining receipts .....	\$7,074 85

These include \$1,420.00 for Mining Leases and \$134.75 for Water Rights.

Three sections of the Division, each of an area of about one thousand square miles, contain ninety per cent. of the mining properties of the Division. They are :—

1st. The watersheds of Wild Horse Creek, Bull River and of the smaller streams flowing into the Kootenay from the east, within 20 miles of Fort Steele.

2nd. The watershed of the St. Mary's River.

3rd. The watershed of the Moyie.

The sections lying respectively north and south-east of these have not been much visited by prospectors, and many square miles of these have never been seen by a white man. The following table gives the recorded mining progress during this season :—

Section.	Certificates of Improve- ments.	Certificates of Work.	Location Mineral Claims.	Placer Claims.	Mining Leases in Force.
Northern.....		14	19		
Wild Horse, Bull River, etc .....		218	216	22	12
St. Mary's River.....	26	370	294		1
Moyie River.....	1	99	106		7
South-Eastern .....		40	38		
	27	741	673	22	20

As the Provincial Mineralogist has visited the Division during this season and will report thereon more fully and more accurately than I can do, I will not go into particulars as to the value and nature of the ores of the Division.

The claims recorded in the northern section lie on Skookumchuck and Northern Section. Cherry Creeks. Though few in number they prove the existence of a mineral belt extending from the St. Mary's River to the region in the Windermere Division, where rich discoveries have been made this year. This section is worthy of the attention of prospectors, as the country is not difficult of access and ore could be transported at a reasonable price to the Kootenay River, which can be navigated with ease as far north as the mouth of Skookumchuck Creek.

The Wild Horse section, as the oldest mining ground in Kootenay, is well known. Many rich discoveries have been made during this season. Now that machinery can be imported with less expense, hydraulic mining will be resumed. Several lode mines will probably become shippers next year.

The St. Mary's section contains one half of the mining properties of the Division. The North Star is the only mine which has shipped ore, but several others are ready as soon as transportation can be secured at remunerative rates.

Extensive development work has been done during the past year with satisfactory results. The upper St. Mary's country is increasing in importance every year and the improvements made in the trails during the past year will decrease the cost of laying down the necessary material for development work.

The Moyie section has the advantage of a railway within half a mile of its most important mines. The *St. Eugene* and other groups are awaiting the construction of railway sidings from which to ship their ores.

In the south-eastern section development work has been done on lode mines near Sand Creek, on Elk River, and at Tobacco Plains. This section includes the coal measures of the Crow's Nest Pass and Wigwam River and the petroleum lands of the Upper Flathead Valley. The selection by the British Columbia Southern Railway of its land grant will leave some of these lands open



STEAMER "DUCHESS"--FROM GOLDEN --ON LAKE WINDERMERE.



"DELPHINE" PACK TRAIN--LEAVING THE SALMON BEDS.



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to the public, and I expect that prospecting for coal and petroleum will be a feature of next year's business.

The construction of the Crow's Nest Railway has not as yet had much effect on the lode mining of the Division, uncertainty as to the rates of freight has in fact retarded development, holders of mines preferring to wait until they can make closer calculations as to the cost of laying down the ore at the smelter.

The coal mines at Fernie are extending their operations, their out-put being increased as the railway extends in carrying capacity, which is limited at present by its unfinished condition. The manufacture of coke commenced on the first of December. Coal is also being mined at a point on Michel Creek. Coal from both points is now in use for railway, manufacturing and domestic purposes, and in a short time its adaptability to the various uses will be known.

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### WINDERMERE DIVISION.

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The Windermere Division comprises that portion of North-East Kootenay  
**Location.** which is drained by the Upper Columbia River and its tributaries as far as and including Horse Thief Creek on the west and Aylmer Creek on the east. It also includes the watershed of the Upper Kootenay River down to and including Findlay and Mud Creeks, its eastern boundary being the summit of the main range of the Rockies, its western the summit of the Selkirks

The drainage area of the Upper Kootenay, above Canal Flats, has as yet received very little attention from the prospector, and no important locations are recorded for that portion of the Division. This whole area, together with the east slope of the Columbia Valley, is geologically a part of the Rocky Mountain Range, which has not so far proved a fruitful field for the prospector.

In consequence prospecting in the Division has almost exclusively been confined to the Selkirk Range, west of the Columbia, and it is to be noted that the past summer has seen an influx of a large number of experienced prospectors from both the north and the south. In the latter part of the season a large number of promising prospects were recorded as a result of this movement, chiefly in the vicinity of Boulder and Horse Thief Creeks, and the coming season will see these properties developed.

Last season's success will cause a still greater number of experienced men to try their fortunes in this part of the Kootenays, which until now has not received its proportionate share of attention.

The few claims which have been developed to any extent have so far continued promising, although in no single instance has work been done on any property which would warrant its being called more than a prospect.

The country lying to the east of Windermere, or Lower Columbia Lake,  
**Physical Features.** is rolling bench land, large tracts of which are now under cultivation, yielding splendid crops wherever any care has been taken to provide for irrigation. The Indians on the Reserve, near Windermere, are cultivating their lands well and intelligently, and some of their grain fields seen by me would have been a credit to any white man.



**Towns.** The only town in the Division is Windermere, which consists of two hotels, as many stores, a school-house, and a few private dwellings; and here the Mining Recording Office of the Division is situated.

**Transportation.** During the summer months, when navigation is possible on the Columbia River, a line of steamers, owned by the Upper Columbia Navigation and Tramway Co., and run under the command of Capt. Frank Bacon, make two round trips weekly between Golden (on the Canadian Pacific Railway) and Windermere.

On the "Duchess" the accommodation and service are both of the first class, good state-rooms, good meals, and every attempt made by the officers to accommodate passengers and to help the mining interests of the District. The Company transport all samples of ore without charge, refusing all payments for such services, and I, myself, among others, am indebted for this courtesy during the past season.

A stage runs twice a week between Windermere and Fort Steele, connecting there with the Crow's Nest branch of the Canadian Pacific Railway. After navigation closes on the Columbia the Fort Steele stage continues on from Windermere to Golden.

**Roads.** There is one good road—the stage road—running through the Division on the east side of Windermere Lake and on the west side of Upper Columbia Lake. From the "Salmon Beds" trails lead off to Toby, Boulder and Horse Thief Creeks. These are all fairly good, although last year they were somewhat in need of repair, and required to be cleared out in several places, and doubtless will receive in the spring the necessary attention from the authorities.

#### MINERAL SPRINGS.

Near Brewer's Ranch, about thirteen miles south of Windermere, and only a few hundred yards from the main road, there is a series of hot springs, which at this point bubble out from the side-hill. The waters as they leave the ground have a temperature of from 90° to 120° F.

These springs, some twenty or twenty-five in number, cover an area of several acres, and are of varying size and temperature, the largest running about as much water as would come out of a 3-inch pipe under a 10-foot head.

The water is clear as crystal, and is evidently highly charged with lime and a little iron, judging from the deposits which form on the surface around the springs. This deposit forms in the shape of a circular basin with the spring in the centre—regular natural bath tubs—much used as such by the people of the locality, who credit the waters with great medicinal properties, a belief handed down by the Indians of the neighbourhood. There are several of these basins in the creek bottom with waters at a temperature of 100° F., while within five feet flows a good sized creek with water at 40°, providing the "hot bath and cold plunge" of the Turkish bath.

The country around is exceedingly beautiful, with good fishing and shooting to tempt the sportsman, and as fresh supplies can be had at all times from Brewer's Ranch, the spot forms an ideal place for the camper out. The property is held by Mrs. Sarah L. Galbraith, of Fort Steele, but nothing has been done as yet either to improve or utilize it in any way.

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FINDLAY CREEK.

Findlay Creek flows into the Kootenay River near "Canal Flats," its watershed forming the southern boundary of the Windermere Division. A good flow of water characterises it, said to amount to 7,500 miner's inches, the fall of the stream being from 75 to 100 feet to the mile.

In the immediate neighbourhood, situated within two miles from the upper end of Upper Columbia Lake, quite a number of locations have been made, all on a series of quartz ledges, which run about north and south, and which are all of the same general character.

I am indebted to Mr. Jas. Brady, M. E., who is interested in many of these claims, for his courtesy in meeting me and pointing out to me all the development work done, in addition to imparting much information in connection with the properties.

Starting with the most northerly, we have in succession the following groups:—The *Sun Lake*, *Thunder Hill*, *Jupiter*, and *Soudan*, and on the south side of Findlay Creek the *Gold Hill* Group.

This group, owned by Jas Brady *et al.*, consists of four claims in one **Sun Lake Group**. block, all locations; situated about  $1\frac{1}{4}$  miles west of Sun Landing, on the Upper Columbia Lake, and one mile from the main stage road running from Golden to Fort Steele. Elevation, 3,100 feet, or about 400 feet above the lake. Country rock, slates and schists, running in a general N.E. and S.W. direction and dipping N.W., with occasional igneous dykes occurring in a general N. and S. direction.

There appear to be three distinct quartz ledges running through the properties—running with the bedding of the schists—which outcrop and have been stripped in several places, proving their continuity. They are somewhat irregular and pockety, jumping from one layer of schist to another. These ledges, which are each from 15 to 50 feet wide, are made up partly from white quartz and partly from a grayish quartz, which gives the impression that it may be a very highly altered quartzite. Interbedded here and there are quartz and talcose schists.

The gray quartz and the schists near the lead are spotted here and there with small cubes of iron pyrites carrying gold, and with occasional particles of galena. The proportion of these sulphides in the quartz I estimated at about from  $\frac{1}{2}$  to 1 per cent. Numerous assays were shown me from material taken from the open cuts, which ran from \$1.05 to \$1.85 in silver and about \$4.00 in gold. These assays were from near the surface and on material which was much weathered, and serve merely as indications as to what may be expected with depth.

Considerable work has been done on these properties, but confined as yet to open cuts and other surface developments.

Of good water and timber there is an ample supply, sufficient for all mining needs. A good log cabin, divided into two rooms, has been erected, and the property can be easily reached by waggon, the surface thereabouts being comparatively clear and the slopes gradual.

This group is owned by Jas. Brady *et al.*, and consists of four locations **Jupiter Group**. in one block,  $1\frac{1}{2}$  miles from Upper Columbia Lake and the stage road, and is at an elevation of 3,500 feet or 800 feet above the lake. The general occurrence of the ledge is here the same as in the *Sun Lake* group, two or three parallel quartz ledges on a ridge 250 to 300 feet above the surrounding country. The out-crops vary from 20 to 60 feet in width and maintain a general N. and S. direction, showing on three of the claims.

*West Ledge.* On the *Jupiter* claim an open cut, 150 feet long, has been run and the ledge cross-cut some 25 feet. From this open cut an inclined shaft has been sunk for 30 feet, near the hanging wall.

*East Ledge.* The east ledge is large and has been exposed on the *Jupiter* and *North Jupiter* in a series of open cuts.

On the west ledge the quartz contains a certain amount of galena in places, together with iron pyrites, but neither as yet exposed in very appreciable quantities. The mineralization, however, is stronger than on *Sun Lake* or *Thunder Hill*. Should subsequent development reveal ore in sufficient quantities to be worked, the properties are so situated as to be cheaply operated and the ore could be readily transported to the Thunder Hill Concentrator, which, however, would have to be remodelled to suit the ore.

This group, owned by Jas. Brady *et al.*, consists of four claims, one of  
Thunder Hill      which is Crown-granted, the others being locations. A large amount of  
Group.              work has been done on these properties, said to aggregate \$12,000, inclusive of the mine buildings, and this not taking into account a tramway of almost two miles in length connecting the mine with the millsite on the lake, to be noticed later.

In a general way the conditions are the same as prevail in the two groups already described. At the point where the main workings are, there is a quartz ledge about 100 feet wide which has here been faulted and thrown to the west about 50 feet and nearly at right angles to the ledge. For about 50 feet on the line of this fault, where the two ends of the ledge come together, there appears to have been a rather considerable deposit of galena, which might be described as a chimney of ore. This has now been taken out to a depth of about 50 feet, and was the deposit on which the property was started, and to treat which the concentrator was erected on the lake shore.

Small quantities of galena are to be found elsewhere in the ledge, but in no place do they give promise of such ore in quantity. Iron pyrites carrying gold occur scattered through the ledge, but, so far as was visible, only to a small percentage, seemingly less than in the *Sun Lake*.

A tunnel has been driven through 75 feet of the solid ledge, the rock from which lay on the dump. This rock I sampled as being representative of the general ledge, Mr. Brady, who was present, agreeing with me as to its representative character. The sample I turned over to the Provincial Assayer, who reports to me that it does not carry more than a trace of gold.

As regards the property generally, the existence of the immense quartz ledge is proven beyond doubt, yet such galena as has been found does not continue in quantities to warrant working. The expectation of the owners is that the property will turn out to be sufficiently high in gold to be profitably worked. I am satisfied that the gold does not exist as free gold and that such gold as there is occurs in the iron pyrites, which in working would have to be concentrated. Fine grinding would have to be resorted to and the concentration effected with suitable appliances. The future of the properties, it may be said, therefore, depends on the percentage of iron pyrites in the rock, as the grade of the concentrates will remain fairly constant, and from my observations values will not exceed \$100 to the ton of concentrates. As far as was pointed out to me, or as I could see at any point on the property, the percentage of iron pyrites in the ledge, as it would have to be mined, did not exceed one or, at the outside, two per cent.

There are several log buildings at the mine, office, bunk-houses, blacksmith shop, stable, etc., now somewhat out of repair, yet serviceable if ever required.

On a steep sand bluff, on the shore of the Upper Columbia Lake, there Thunder Hill has been erected a "50-ton Lead Concentrator," constructed by the Chicago Concentrator. Iron Works. The plant consists of the usual buildings and bins, and the machinery may be thus itemized:—1, 7 x 10 Blake crusher; 2 sets, 26 x 12 rolls; 1 set, 16 x 10 rolls; 2 sets, double, 4-compartment jigs; 2 sets, 2-compartment jigs; 1, 18-in. double-decked Evans table; an automatic ore feeder; and 3 revolving screens, with all necessary elevators, etc. The power plant consists of 2 Watrous boilers, a Watrous engine and all necessary pumps. The entire plant is still in good condition and practically new.

A surface tramway connects the mine ore-bins with the overhead concentrator ore-bins, and is equipped with iron ore cars which run down by gravity and are hauled up empty by horse-power. An inclined tramway was likewise provided for taking the concentrates to the dock to be loaded on to the steamer.

Good and suitable office and laboratory buildings are on the ground, together with ample accommodation for employees.

As already noted, this plant was erected to treat a certain body of galena occurring in the mine and was constructed before the limited extent of such ore body was known. It now stands idle, never having had ore on which to run.

Situated on Windermere Mountain, at an elevation of 5,100 feet, and Swansea bonded to the Mines Development and Guarantee Trust Company, of Rossland, who are doing some development under the superintendency of Mr. Mineral Claim. Powers.

The country rock is a quartzose limestone which appears to be much faulted and broken, there being evidence of a series of faults running N. 45° W., or almost with the range of hills. Along the line of one of these faults there is evidence of a crushing effect, which extends a short distance into the country rock on either side leaving the rock still in place, but much crushed. It would seem as if this crushed material had been more or less cemented with lime which had filtered through it; the waters in the same way bringing copper in solution, which, deposited in the crushed zone, now exists as blue and green carbonates, occurring in masses, mixed with the broken rock. These masses are sometimes of considerable size, but as yet have not shown any continuity.

Some 20 to 30 tons of selected ore were on the dump at the time of my visit, of which I took a sample and found it to assay 17.5 per cent. copper, but with no gold or silver values.

Lake View mineral claim is a location 300 feet higher up the hill, owned by F. W. Mulholland, of Rossland, but it is merely a prospect with little work done on it. A 2-inch seam of red iron oxide is exposed in a small cut, but I could see no mineralization of value.

#### TOBY CREEK.

A location on the mountain to the north of the main creek, about six Mineral King miles above the North Fork, or twenty-three miles from the "Salmon Beds." Mining Claim. Elevation, 6,800 to 6,900 feet. Owned by and bonded to the same parties as the *Hot Punch*, presently to be described.

The point where the mineral was discovered is a steep bluff of rock standing out of the hill-side which has elsewhere a somewhat regular slope of about 20°. In the face of this bluff, and necessitating very little work to expose it, there is a great blow-out of quartz, over 150

feet wide, through which, running in all directions, are stringers of galena up to 8 inches wide, with occasional widenings to 24 or 30 inches of solid ore. Occasional streaks of gray copper also cut the quartz and likewise the galena.

I was unable to find any definite ledge of quartz leading to this large surface exposure, and am somewhat at a loss to definitely classify the exposure from the development done.

About 50 feet below the exposure, and about the same distance to the north-east, a tunnel had been run in 50 feet, N. 65° W. This tunnel was expected to cut the ore body at a depth, but had failed to do so. Galena shows in the roof at only one spot, and there, not very strongly.

The country rock, as exposed in the tunnel, is quartz-schists and quartzites. Above, and to the west of the "blow-out," there is an exposure of a rock composed of quartz and lime, but only slightly exposed. A little further down the hill and underlying are exposures of black shales.

The surface exposures of ore are very considerable, and the ore is of good quality. The galena occurs both in large crystalline masses and also in the finer crystalline form. A sample of the coarse-grained galena taken by me gave on assay, 75.2 % lead, 51 oz. silver. The gray copper is also present in very appreciable quantities. There is certainly a remarkably good surface showing, and the fact that the tunnel failed to reach it at a depth does not, to my mind, prove that the ore does not go down. In my judgment the tunnel should have been driven further to the south to determine the point definitely.

#### NORTH FORK OF TOBY CREEK.

A location on the North Fork of Toby Creek, about six miles up from the main stream, at an elevation of 6,200 feet. Owned by Ben. Abell and  
Hot Punch      the main stream, at an elevation of 6,200 feet. Owned by Ben. Abell and  
Mineral Claim. E. Stoddart, of Windermere, and bonded to Collett & Starbird, of Fort Steele.

On a steep bank of a small tributary creek coming in from the west a quartz vein of from two to three feet wide, outcropping nearly horizontal, has been traced for several hundred feet. The outcrop at many points where exposed is heavily mineralized. At one of these points an inclined shaft has been sunk some forty feet on the vein, which was found to dip S 70° W. at an angle of 30°. From this shaft several tons of galena, carrying gray copper, had been taken, assaying 50 to 80 oz. silver to the ton.

The ore exposed in the side of the shaft would indicate a thickness of from 6 to 20 inches of solid galena, which continued down for some 20 feet, when the galena became largely mixed with iron pyrites, an amount of calcite appearing in the vein about the same point. Some 200 feet to the east of the tunnel, and on the trail, there is a good outcropping of galena 12 inches thick, accompanied by arsenical iron.

Sufficient work has not yet been done on the property to show what might be expected, further than that a fairly well defined vein exists, carrying in places galena and gray copper in considerable quantity.

I have a letter from Mr. Collett, dated December 20th, in which he says:—"We have sunk 70 feet and drifted 30 feet north and south. At the bottom of the incline was 30 inches of clean ore (galena), carrying a good deal of gray copper and some copper pyrites. The ore assayed 50 % lead, 120 oz. silver, 3 % copper, and \$3.85 gold."

Two locations about half a mile south of the *Hot Punch*, owned by Royal Crown, Matthews, Stoddart & Fraser, of Windermere. Elevation, 5,800 feet. Nos. 1 and 2. There is exposed, in a 10-foot open cut and in some 100 feet of stripping on the steep hillside, a slip in the schists carrying from 1 to 3 inches of galena. The vein is exposed on one side and surface wash has filled in the crevice. Very little work had been done on the property and such of the vein as was exposed did not give much promise.

This group consists of three full locations on the steep hillside to the Delphine Group. east of the North Fork of Toby Creek, and some 6 to 8 miles from the main creek, or about 20 miles from the "Salmon Beds," the head of steamer navigation on the Columbia River. The claims are known as the *Eureka*, *Delphine* and "616" mineral claims, and adjoin, lying in a general north and south line, with the *Eureka*, the most southerly. Owners, R. A. Kimpton, Geo. Starke and Arthur Harrison, of Windermere. Having only this year been located, but little work had been done on these properties at the time of my visit, August 27th, but such slight work as was in evidence gave great promise.

A vein of solid galena, varying from 12 to 36 inches, had been exposed in a series of open cuts for a distance of some 150 feet; while surface scrapings further along the same line would seem to indicate that the vein extended pretty well through two, at least, of the claims. The vein is somewhat broken at the surface by small slips, etc., but has every appearance of being a true fissure vein, with strike S. 15° E., and dip S. 75° W., apparently cutting the schists.

When I viewed the properties the greatest depth attained was about ten feet and the length of the exposure in the cut about 30 feet, the work having all been done on the *Delphine*, the central claim. Some 25 or 30 tons of galena had been taken from the surface showing, of which 20 tons were afterwards packed over the trail to the "Salmon Beds" with the intention of making a trial shipment of them. Unfortunately, the sudden fall of water in the Columbia at that time, rendered it impossible for the steamer to ascend the river so far and the ore had to be left over until spring.

A sample taken by me as representing the ore from which the shipment was made gave on assay 64.68 % lead, 50 oz. silver. Certain of the ore will undoubtedly go higher than this, and it is as yet, too soon to say what will eventually prove to be the average.

Should subsequent development fulfil the promise of the surface showing, a large body of ore will be found, and so situated on a steep hill that it can be reached at a depth by a tunnel. A waggon road could be built from the "Salmon Beds" at a reasonable cost, and will be so built as soon as it is justified by the mining development.

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#### COPPER CREEK.

Mineral and Copper Creeks are two short creeks flowing into Toby Creek from the south, two and four miles respectively, above the North Fork. At this latter point the elevation of the main stream is in the neighbourhood of 4,500 feet.

Between these two creeks and surrounding their basins a large number of locations have been made, the district being generally known as the Copper Creek district; the trail following up the creek of this name. It is by no means an easy trail to follow, being very steep and poorly made.

The claims here mostly show copper, but as yet in no workable quantities. Few, if any, have more than one year's assessment work done on them, for which reason it is only possible to speak of indications.

A location, owned by C. Troyer, of Windermere, situated on Copper Creek slope, at an elevation of 5,700 feet. No work has been done on this claim with the exception of a little surface scratching near the discovery post, where a deposit of quartz in a quartzose-schist has been uncovered, carrying a few patches of copper pyrites and considerable blue copper carbonate stain not in very encouraging quantities.

A location staked by Isaac Norton in June, 1898, near the *Paul* mineral claim, at an elevation of 6,000 feet. Practically, no work has been done on this property. At this particular point the country rock is completely covered with wash, but at the discovery post there is showing a loose piece of quartz, carrying a little copper pyrites and some blue stain.

Lying next to the *Paul* is the *Morning Glory*, a location owned by C. Troyer. I am informed that certain development work has been done on this claim, but continued searching for an hour, on my part, failed to show where it was.

This location, owned by the same party, lies above the *Morning Glory*, and the same quartz ledge is supposed to run through both claims. On this property considerable work has been done in the way of open cuts. Exposed in these is a quartz lead, some 24 inches wide, interbedded between the schists and dipping N. 30° E. at an angle of 65°. In places there is a quantity of copper pyrites showing in the quartz, but as yet not very strongly.

On the summit, between Mineral and Copper Creeks, on a claim known as the *Cracker Jack*, three quartz veins are exposed, respectively, 6 feet, 3 feet and 1 foot wide, which cut across the schists and slates. The quartz contains a small percentage of copper sulphides and stain, which is strongest in the smallest ledge. Very little work has been done on these as yet. The same remark applies also to the *Copper King*, a location owned by E. Stevenson, in which the general conditions are the same as in the *Cracker Jack*.

A number of additional prospects have been located in the neighbourhood, all equally undeveloped, recorded as the *Copper Queen*, *Sunny Queen*, *Sunny Princess*, *Shady Prince*, *Horse-Shoe*, *Grass Valley*, *Golden Star*, *Shady Park*, and *Letter B*.

#### BOULDER CREEK.

This group consists of six locations, viz., the *Venus*, *New Chum*, *Pretty Girl*, *Minniehaha*, *Old Chum*, and *Beauty*, held by the New Golden B. C. Company of London, Eng., represented by W. G. Mitchell-Innes, of Golden. The claims are located near the head of Boulder Creek, on the right-hand side going up, and form a belt extending over the summit into Law's Creek. Work has been confined to the *Pretty Girl*, which lies on the summit of the divide. The altitude of the valley of Boulder Creek, below the claims, is 6,200 feet, while the open cut on which the work was done on the *Pretty Girl* is at an elevation of 9,250 feet, more than 3,000 feet above the valley.

This open cut, 12 feet in length, has been sunk 10 or 12 feet in a soft shale, dipping nearly vertical, and striking, approximately, N. 25° W. Lying between the layers of the



THUNDER HILL CONCENTRATOR—UPPER COLUMBIA LAKE.



CUT BANK—MOUTH OF DUTCH CREEK—WINDERMERE DIVISION.





shales or slates across the cut were bands of gray copper and some carbonates of copper, forming a highly mineralized zone some 6 to 8 feet wide, from which large pieces of splendid ore had been taken. The shales were very much weathered and soft to the depth attained here, and are liable to an alteration of dip as they go down.

There seems to be no vein, in the usual acceptance of the term, but a zone in the bedding of the shales, which, at the surface, carries very considerable quantities of ore. A fairly representative sample of this ore gave me, on assay, 26.68 % copper, 55.5 oz. silver to the ton.

Upon the very meagre data obtained when the open cut was down 8 feet, and with no other positive surface showing, the Company started a tunnel 150 feet vertically below the cut, and approximately 250 feet horizontally from the same. It was expected that at 90 feet in this would cut the ore-body at a point where a bend in the same was supposed to occur from the indications of the surface shales. From this point the tunnel, it was supposed, would run on in ore. At the time of my visit, September 2nd, the tunnel was in 200 feet, and had failed so far to find the ore-body. The management had just begun to sink a shaft in the surface showing to obtain more data as to the dip of the ore, which they intended following down 30 or 40 feet. From this data they would then drift to the right or left from the end of the tunnel.

I am since informed that the ore has been struck from the tunnel, and has been found very promising, both as to quantity and quality; but am unable to obtain any reliable figures regarding same.

There is connected with the property a good large log cabin, situated at an elevation of 7,500 feet, just above timber line, from which point all mine timbers have to be packed to the workings. The trail from the valley up to the property has been built by the Company, and is in very fair condition.

This group consists of four locations, viz.: The *Calamity Jane*, *Delos Delos Group.* and *Trojan*, on the right-hand bank of Boulder Creek, and across the creek the *Colossus*, owned by Tom Jones, of Golden, and bonded to the Mines Development and Guarantee Trust Co., of Rossland. The claims are situated on a steep bank and the work has been done on the *Delos* a few feet above water level.

The country rock is composed of slates, which appear to be bedded nearly horizontally, while the cleavage planes are usually vertical, although in one or two places they seem to be horizontal.

Running through the slates and parallel with the cleavage planes, is a belt or zone some 150 feet wide, composed of quartz stringers running with the belt, but very irregular as to direction. These stringers vary in size from 1 inch to 24 inches, and at the surface where a lot of stripping has been done, are very much jumbled. It is probable that several of these stringers will get together, forming a larger ledge which may be followed to a depth, but this has not as yet been proven. Along this surface outcropping quite large masses of copper pyrites are found in the quartz, from which several tons of ore could be obtained.

At the lower end of the stripped surface a tunnel has been driven in 53 feet, of which the first 39 feet was a cross-cut and the remainder on a quartz ledge about 20 inches wide, in which occurs a very fair percentage of copper pyrites. This ore has certainly a very striking appearance, being often in great masses of solid pyrites. My sample of the clean ore gave me on assay 32.48 % copper, with only traces of silver.

Whether the large surface showing is connected with a large and more regular ledge remains for further development to prove.

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### GOLDEN MINING DIVISION.

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The Golden Mining Division comprises the drainage area of the Columbia River and tributaries below Horse Thief Creek and above the Town of Moberly, which lies between Golden and Donald.

This Division, I regret to say, I was unable fully to examine, entering it from the south on September 12th and nine days later encountering fresh snow on the higher elevations, which greatly retarded my work. The snow continuing to fall I was obliged to give up the work for the season, except on such claims as were at a low elevation. There was over a foot of snow on the claims on the 29th September, and in a district where the development work consists chiefly of open cuts, it was impossible under existing conditions to form any idea of the merits of a property.

The only town in the Division is Golden, on the main line of the Canadian Pacific Railway, a progressive and flourishing centre, with many comfortable homes; but viewed from the railway not making much display, the chief residential portion lying across the Columbia River. Its hotels are good, the Columbia House being worthy of special notice, and would be a credit to any town in the Province.

Here are situated the Government Offices and the Mining Recording Office for the Division. The mineral collection at the office of the Mining Recorder, Mr. Lang, is well worthy of a visit. It is the best arranged collection of its kind I have seen in the Province. It was my intention to have had an illustration in this year's Report showing its arrangement, and I would have had but for a mishap to my negative.

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### SPILLIMACHENE AND JUBILEE MOUNTAINS.

On both the Spillimachene and Jubilee Mountains, lying at the junction of the Columbia and Spillimachene Rivers, a large number of claims have been recorded, of which a few are Crown-granted. Within the last two or three years, however, little work has been done on any of these claims, and attention was paid by me to but a very few of them.

A Crown-granted claim, 1,500 by 600, owned by Sheriff Redgrave, Rothschilds of Donald. This claim is on the south-west slope of Spillimachene Mineral Claim. Mountain, at an elevation of 3,700 feet, and is reached by a good trail used at one time as a sleigh road from Spillimachene Landing, a distance of eight miles.

There is a tunnel run in about 50 feet, the first 30 feet in wash and the remainder in a highly silicious limestone, resembling more the rocks of the Rocky Mountain series. I could observe no mineral of value, either in the tunnel or in the country rock, but on the dump found a few pieces of rock with galena. The work showing, I was informed, dates back to about 1886.

Giant Mineral Claim. A Crown-granted claim, 1,500 by 1,500, on the south-west side of Spillimachene Mountain, owned W. J. R. Cowell, Assayer, of Victoria.

*Lower Tunnel.* In 300 feet in limestone. At 100 feet in from the surface there is a deposit of "heavy spar," carrying about 15 % of galena, but, as far as I could see, the deposit was of the nature of a pocket. The rest of the tunnel is in limestone, through which, here and there, are stringers of galena, "frozen" to the country rock, and in no instance of very appreciable size or strength.

*Open Cut.* Above this lower tunnel, to the north-west, and at an elevation of 3,825 feet, is an open cut, showing lime and heavy spar, heavily charged with galena. About 10 feet under this, there is an outcropping of slate, dipping to the south at an angle of 60°, and with a strike about E. and W. (mag.)

*Upper Tunnel.* At an elevation of 3,850 feet, there is another tunnel, said to be in 100 feet, but now caved in. Judging from the dump, this tunnel was run in a black shale, which does not seem to have been very highly mineralized. I noticed in the shales concretions or kidneys of zinc blende and galena, but in no great quantity.

*Shaft.* Within 50 feet of the upper tunnel there is a shaft, said to be down 20 feet, but which I could not descend.

A Crown-granted claim, 1,500 x 1,500 feet, owned by Henry Croft, of  
**Hidden Treasure** Victoria; a continuation of and situated above the *Giant*, at an elevation  
**Mineral Claim.** of 4,250 feet.

From the development done, it would appear as if, at the contact between the lime and slates already mentioned, there was a deposit of heavy spar (sulphate barium), which follows the contact as far as I traced it. This heavy spar is all more or less mineralized, the mineralization sometimes extending into the country rock. At lower points on the hill the mineralization seems to be chiefly zinc blende, which, as one proceeds higher up, changes to galena, while still higher up the mineralization seems to be chiefly copper.

The principal work on the claim is an "excavation" in the side of the hill, started as an open cut and continued as a tunnel. In this spot, some very fine carbonates of copper and some copper glance were found. A shipment of from 5 to 10 tons is reported to have been made, which gave a return of 53 % copper. In getting this ore out, however, they "gophered" the deposit in all directions, following small stringers of ore, and not leaving enough ore in place to give me a good sample.

#### BUGABOO CREEK.

Bugaboo Creek is a long and rather important stream flowing from the west into the Columbia River near Galena P. O. The trail leading to the claims on this creek, starts in from the Columbia at a point opposite Spillimachene Landing, to reach which, from the Golden and Fort Steele waggon road, it is necessary to swim the horses across the Columbia. The distance from Spillimachene Landing to the head of Bugaboo Creek is 28 miles, over a rough but not difficult trail.

Are situated at the very head of Bugaboo Creek, on the summit of  
**No. 21 M. C. and** the divide, between Hawser Creek in West Kootenay, and Bugaboo in  
**Western Cross** East Kootenay, at an elevation of 7,500 feet. These are locations made  
**M. C.** by T. Mercier, and bonded to the Golden and Fort Steele Development  
 Company.

The country rock is composed of a dark slate or shale, lying rather flat, through which cut various quartz leads of small size, and occasional stringers of solid galena accompanied by iron sulphides. These galena veins, so far, have not been found wider than a few inches, and the quantity of ore exposed is not great. The assays as given me, however, from the selected ore, are high, running from 100 to 175 oz. in silver.

The development is not sufficient to prove what may be expected as to quantity, but should the quality continue as good, such ore could be profitably shipped even from this inaccessible point.

The first tunnel started, after getting in about 20 feet, struck such a stream of water that it had to be abandoned, as the men could not continue working. A second tunnel was therefore started and was in a short distance at the time of my visit, but had not proceeded far enough to prove up anything.

*Discovery Cut.* An open cut, 50 feet long and 5 feet deep, shows a rather indefinite quartz vein running S. 45° E., with some galena and iron. Selected samples are said to have given values of \$75.00. There are other open cuts and pits, but nothing very definite could be learned from them.

*Iron Seam.* Six feet of black looking sulphides is showing in an indistinct vein in the slates, but I could not learn the values obtained.

Copper has also been found on the property, but not in paying quantities.

The *Western Cross* lies just above the *No. 21*, at an elevation of 7,650 feet. I could find no vein on this property, but a zone in the rather soft slates, lying just above their contact with a more compact argillite, is highly impregnated with galena and iron sulphides.

#### FRENCH MOUNTAIN.

French Mountain is situated to the west of Bugaboo Creek, just where it leaves the marsh forming the basin at the head of the creek, from which point the trail branches off.

There have been a large number of claims staked on this mountain, the best known being the *French Group* and the *Bugaboo Group*.

This group consists of three locations, the *Last Chance*, *France* and *French Group*. the *Agnes*, held by Dr. H. E. Langis and T. Mercier.

*Last Chance.* Elevation, 6,800 feet. The country rock is composed of slates and some conglomerates. Through the slates are a number of white quartz veins, from 18 inches to 6 feet thick, the quartz being vitreous and highly crystalline. Pockets of galena show up here and there through the quartz, not in any great quantity as far as exposed, but reported as running high in silver. Also occurring in the veins is a steel grey mineral, which seems to be a mixture of galena and sulphides of iron, weathering to an iron oxide, which carries values in gold, silver and lead.

*Agnes Mineral Claim.* Elevation, 7,600 feet. On this claim is a large deposit of what appears to be arsenical iron and iron pyrites mixed, in fine grains. Showing in a 10-foot open cut there is a 6-foot ledge of this traceable for a considerable distance. The values contained I could not obtain. A talcose schist forms one side of the vein.

This group, also owned by Dr. H. E. Langis and T. Mercier, consists *Bugaboo Group*. of three claims, all full sized locations, the *Surprise*, *Magda* and *Hortense*.

*Surprise Mineral Claim.* Elevation, 7,250 feet. In this claim what is apparently a large dyke of igneous rock cuts through the shales in a general S. 35° E. direction and with a variable dip, the rocks being much distorted. In this dyke and running with it is a fair-sized quartz vein, the rock on both sides of which seems to be of the same character, although on the foot-wall it is somewhat fine-grained.

Development consists of an open cut and a 20-foot tunnel, running N. 70° W., driven on a quartz vein from 12 to 20 feet wide, the tunnel only gaining a depth of 15 feet from the surface. Another open cut and similar tunnel has been driven 50 feet higher up and to the east, and shows stringers of galena 3 inches wide, frozen to the walls. A 22-foot shaft has also been sunk on the same vein, about 200 yards to the north. The vein is mineralized where ever exposed, but not showing mineral in quantity as yet.

*Magda Mineral Claim.* This location lies 300 yards to the N. E. of the *Surprise*. There is here exposed a large quartz ledge in which a 20-foot open cut has been run. The quartz is more or less mineralized with iron sulphides.

This group consists of the adjoining mineral locations, the *June Bug* Balrath Group. and *Riverside*, owned by Hon. F. W. Aylmer, of Golden, situated on Bugaboo Creek, at an elevation of 3,600 feet above sea level, or 700 feet above the Columbia River, and distant therefrom by trail from Spillimachene Landing about 8 miles.

*1st Vein.* Just above the Falls there is exposed on the creek bank a 10-foot ledge of iron-stained quartz, running approximately N. 70° W., and cutting at a slight angle the slates and quartzites forming the country rock, which run nearly E. and W. (mag.) The dip of the ledge is nearly vertical. Although strong, the ledge is not very clearly defined, being mixed toward the edges with slaty material, which seems to be a part of the ledge. The quartz carries no free gold, and where exposed is mineralized with iron pyrites carrying gold, but not in sufficient quantity to have any practical value. The exposure on the bank of the creek is about 12 feet high, and above this there has been a small amount of stripping done, exposing the ledge.

*2nd Vein.* Just below the Falls, and some 75 to 85 feet farther to the east, or lower down the stream, and about 25 feet, vertically, below the exposure on the 1st vein, a tunnel had been driven in about 25 feet on the foot-wall of a 24-inch vein of quartz, stained with iron, and not very clearly defined. This vein runs about parallel with the 1st vein and has the appearance of being a separate ledge, but may prove to be a spur from the main lead. The quartz in this is of the same character as in other vein, and does not carry important values.

After following this ledge in 25 feet, N. 70° W., the tunnel bears off to the left (S. 60° W.) for 125 feet, cross-cutting the country rock, here consisting of fine-grained quartzites and cutting on the way several small quartz stringers running irregularly. At this point a drift was run to the right for 15 feet in the country rock, but without result. The main tunnel makes a bend still further to the left for about 15 feet, and in so doing cuts obliquely the 1st vein, here about 10 feet wide, at a point not exceeding 15 to 20 feet from where it was uncovered in the open cut already referred to.

A shaft, said to be 45 feet deep, is on the property, very well timbered and provided with a horse whin, but it was so filled with water that I could not get down. This shaft is clearly not in line with the course of either of the ledges exposed, and I was unable to discover any outcropping to indicate upon what it had been sunk.

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#### MIDDLE FORK OF THE SPILLIMACHENE RIVER.

So far locations on this stream have been pretty well confined to the vicinity of its source, the trail to which starts from the Columbia River, at Carbonate Landing. At the landing horses can usually be obtained, and good accommodations are provided at the hotel, conducted by C. Cartright.

The trail, after leaving the landing, crosses over the summit into the valley of the North Fork, below Loon Lake, thence climbing over another summit into the valley of the Middle Fork, which it follows. The trail is a good one, well kept and not very rough. The distance from the landing to the head of the Middle Fork is about 30 miles.

### VERMONT CREEK.

A number of claims have been located on Vermont Creek, one of the tributaries of the Middle Fork, and a large amount of work has here been done. Some years ago a considerable quantity of ore was shipped from here and hauled over the sleigh road down to Wells' Landing. Much of the ore, however, never got further than the river bank where it was left, as being too low grade,—the result of having no competent assayer at the mine to guide the sorting of the ore.

As very little work has been done on the creek in the past two or three years, I did not visit the old workings.

### COPPER CREEK.

On this creek a number of prospects are located, some said to be very promising, but not as yet developed to any extent.

### CARIBOO BASIN.

This basin is situated at the head of Cariboo Creek, which flows from the north into the Middle Fork, about 24 miles from Carbonate Landing. There are a number of locations in and around the basin, the most important of which are noted below.

Located in the Cariboo Basin, at the extreme upper end, at an elevation of 8,900 feet. It is a 1,500 x 600 Crown grant, owned by L. B. Ellen D. Keyser and J. C. Jolliffe, of Golden. On this property there is a 65-foot Mineral Claim. tunnel on a 6-foot quartz vein, carrying a pay-streak of iron sulphides, averaging about 2 inches wide, from which streak good values in gold are said to have been obtained. The rest of the vein is not mineralized and does not carry values.

Is a Crown granted claim, adjoining the *Ellen D.*, and is held by the same owners. Elevation, 8,700 feet. A tunnel driven in 50 feet crosscuts Buckskin Mineral Claim. a number of small quartz stringers, and near the face has cut a quartz ledge 24 to 30 inches wide, carrying a small percentage of iron sulphides containing values chiefly in gold.

I am of the opinion that the quartz in this locality does not carry free gold, except near the surface, and as the result of the decomposition of the sulphides.

### BOBBIE BURNS BASIN.

This lies to the north of the Middle Fork, about three miles, at the head of a creek of the same name, and is distant from Carbonate Landing some 27 miles. There are a number of locations in and about the basin, mostly on well-defined quartz ledges, carrying varying quantities of iron sulphides, with gold values, but, with the exception noted below, only slightly developed.

A Crown-granted claim near the centre of the Bobbie Burns Basin, at an elevation of 7,650 feet, and owned by Robert Frothingham, of Ottawa. Robert E. Burns Mineral Claim. The country rocks are slates and schists, having a strike about N. W. and S. E., and dipping at a high angle. Cutting these rocks, and having a strike about N. W., is a series of quartz veins from 1 to 4 feet wide, while a cross-course series of smaller veins cuts this main series nearly at right angles. The veins are all mineralized, more or less, with cubical iron pyrites and a small quantity of galena, with occasionally some arsenical pyrites. The mineralization is not uniform, being greater in certain spots, and would appear to be greater in the cross-course veins than in the main series. A concentration of mineral usually occurs at the intersection of veins of the two series.

On a knoll, near the centre of the basin, an open cut has been run for a distance of from 150 to 200 feet, N. 45° W., on a vein of the main series, exposing such vein, here about 3 feet wide, the vein matter having been excavated to a depth of 6 to 8 feet. In this cut, two or three cross-course veins come in from the sides. The veins, to the depth exposed, have been affected by the surface influences, and the iron sulphides, which evidently existed in considerable quantities, have become oxidized and partly removed, leaving the quartz in a honey-combed condition, in which it is sometimes possible to find visible gold. The surface material from this cut has in the past produced some free gold, by washing, but I am of the opinion that such gold was only superficial, and was entirely the result of the surface oxidization of the sulphides. In the bottom of the cut, even at a depth of 8 feet, sulphides of iron, both yellow and white, were beginning to appear, and will probably continue to be the form of mineralization in the veins, as depth is attained.

The veins are strong, and seem to be regular fissures, and it is exceedingly possible that, as soon as the prospectors get tired of hunting for free gold and turn their attention to the development of the veins, for the sulphides contained, such sulphides may be found in paying quantities.

*Stamp Mill.* About the year 1891, a Fraser & Chalmers 5-stamp mill, with 750-lb heads, was erected in the basin by the then Bobbie Burns Company. The mill is still standing and in good condition, in a substantial log building on the hill-side, and so situated that the waggon road, about half a mile long, brings the ore from the "open cut" referred to to the level of the feeding platform. The mill is well equipped, with a "Tullock automatic feeder," plates, etc.

The tailings were run down to a small flat, where they were empounded and collected, probably for further testing.

The mill was run by power supplied by a Pelton wheel, the water for which was conducted from a small stream in 8-inch iron pipes, under a head of about 100 feet.

I have been shown a report on the operations of this mill, by a well-known mining engineer, written at that time, in which he states that 70 tons of ore were run through the mill, and that 2 dwt. 3 grs. of fine gold per ton was recovered by the mill, while the average of the tailings in the pits was 12 dwt. 23 grs. This ore was taken from the surface cut, and may have been enriched by natural concentration, but of which there is no record.

The operations go to prove that, even at the surface, the greater part of the gold values are in the sulphides; and I think that with depth, practically all the gold will be found to so exist.

#### MIDDLE FORK PROPER.

Is a location on the Middle Fork, just below the Bobbie Burns Creek, Lincoln Mineral at an elevation of 6,000 feet, and is owned by W. C. Tillson, Salem, Or. Claim. A tunnel has been driven in about 90 feet, N. 45° W., cross-cutting a couple of small barren quartz ledges near the mouth of the tunnel. The remainder of the tunnel is through the slates, etc., forming the country rock.

Also a location on the Middle Fork, just below Bobbie Burns Creek, Flying Dutchman at an elevation of 6,100 feet, and is owned by G. B. McDermott, G. E. Mineral Claim. Foster, and Jno. Henderson. The country rock is composed of the slates common to the district, and through these cuts a quartz vein, accompanied by stringers of spar. The slates are much disturbed, and the vein is very irregular as to width. The vein, having a strike of N. 30° E., with a dip to N. of 70°, is exposed on the face of the hill for 50 to 100 feet, and then cuts into the hill. A short distance to the east of the



surface exposure a tunnel has been run in 150 feet, cross-cutting the ledge. After going right through the ledge and into the country rock, the tunnel makes a sweep to the right of 180°, and cuts the ledge again from the inner side, forming a letter S, when it follows the vein for 10 to 15 feet.

The quartz is here 3 or 4 feet thick, and scattered through it are patches of iron sulphides, in some places forming a considerable portion of the vein, but not averaging over 5 % of the same.

I took a sample of the iron sulphides, as pure as could be obtained with the hammer, and I find, on assay, that they contain \$20 per ton in gold. Here, again, the gold values depend entirely on the quantity of sulphides occurring in the vein, as the quartz carries no free gold.

#### INTERNATIONAL BASIN.

This basin lies at the very head of the Middle Fork of the Spillimachene River and 30 miles from Carbonate Landing, the basin being at an elevation of over 8,000 feet, while the claims on the hillside extend up to a height of over 9,000 feet, continuing over the summit into the Duncan River country of West Kootenay.

The basin is above timber line and is surrounded by glaciers. The trail passes over the foot of one glacier which extends down into the valley to an elevation as low as 6,200 feet.

The slope of the sides of the basin is about 20°, broken by small plateaux and covered with rock slides, above which the cliffs rise seemingly perpendicularly.

The development work done on the claims shows that there is a system of large quartz ledges cutting through the basin about N. 70° W., and plainly visible, continuing up the face of the cliff, cutting the slates and shales comprising the country rock. A secondary series of cross course veins, evidently of later origin, cuts the main ledges mostly at right angles.

These secondary veins are much smaller than the main ledges, but seem to be more highly mineralized.

I reached the basin on September 23rd and was unfortunate in that a heavy fall of snow, of the previous day, lay on the ground, filling up all the open cuts and covering all the dumps, so that I was not able to make as minute an observation as I should have liked.

The principal claims are noted further on with as much detail as was possible under the circumstances. The main quartz ledges, mentioned as cutting the cliffs, continue right through the hill, and on the other side of the hill upon these ledges, and others similar, is located the much-talked-of Bennison Group. This group, although lying within less than a mile of the basin, I was unable to reach, as the trail led over a dangerous glacier, and, with fresh snow on the ground such an attempt was considered too dangerous to be risked, leaving as the alternative a trip of over 50 miles around to reach this group.

A Crown-granted claim, 1,500 by 600 feet, owned by J. L. Spink *et al.*, International. of Toronto, and situated at the upper right-hand corner of the basin at Mineral Claim. an elevation of 8,400 feet. There are at least two strong main quartz ledges cutting through the property, the out-crops plainly traceable on the surface for several hundred feet and running N. 55° W.

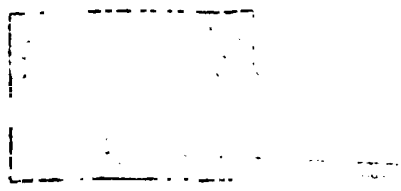
On these main ledges are several open cuts and a shaft, said to be down 50 feet, also some smaller pits. I was unable to get into any of these and had to judge of the mineralization from the material on the dump, evidently piled up as ore. From this I should say that the quartz carried a small percentage of galena, not of great importance, and a still smaller amount of gray copper. The chief source of mineralization was iron sulphides, which are



BOBBIE BURNS BASIN—MIDDLE FORK, SPILLIMACHENE.



MIDDLE FORK, SPILLIMACHENE RIVER—NEAR HEAD.



irregularly distributed through the quartz, and which carry certain gold values. Judging from the dumps I should say that on the gold values contained in these iron sulphides the value of the property depends.

A certain amount of free gold has been found on the surface, but I am satisfied that the quartz carried no such gold except as associated with the iron sulphides, or from the oxidation of the same. As to the percentage of iron sulphides present in the quartz ledges as exposed, I am unable to form an accurate opinion for reasons already stated, but the amount is such as to at least encourage further development.

A location owned by Geo. Stark, M. Dainard *et al.*, and is situated directly below the *International*. The quartz ledges of the *International* Favourite Mineral Claim. probably extend into this claim, but are not exposed on the surface or by any workings that I could find. A tunnel has been started below the *International* ground and has been run in for two sets in slide rock. There was no mineral in place visible either in the tunnel or on the surface.

Crown-granted claims owned by J. C. Jolliffe and A. H. Stracey, of Standby & Maud S Golden. These claims are adjoining and are to the north-east of the *International* Mineral Claims. the *Maud S* being an extension up the hill of the *Standby*. The main quartz ledges cut through both these claims and are very strong and permanent.

On the *Standby* there is a 90-foot tunnel, also a 40-foot shaft and a number of open cuts on the quartz ledges. In the tunnel the work was started on one vein, but after going a few feet cross-cut to the left and followed in another ledge. A little galena is found with the quartz, but the principal values are in gold occurring in iron sulphides. I was unable to get down the shaft, but the ore on the dump showed a fair amount of iron sulphides.

On the *Maud S* there is a tunnel in 250 feet, which in its course has cut three large quartz ledges. The largest, 10 feet wide, has a strike N. 75° W., while the other two run N. 50° W., perhaps indicating the possibility of a third series of veins. These veins are somewhat mineralized with iron sulphides carrying gold.

Some 150 feet further up the hill there is an open cut on the big ledge, which here, in addition to the iron, has a considerable quantity of galena showing, amounting to about 5 % of the face of exposure.

Formerly the *Whistler Fraction*, is a location held by Dugald McDou Lochinvar gall. An open cut of 10 feet was started on a large quartz ledge, which Fraction. seems to cut out at a few feet below the surface. The strike of the quartz is N. 55° W., and it is barren where exposed. There is a second open cut on one of the cross-course veins, showing a small quantity of iron and galena. The surface here is quite bare and I traced the vein for some 100 feet, but was unable to trace it any farther.

A location owned by L. B. Keyser, of Golden, and lies next to *Maud* Picton Mineral S and above the *Standby*. A 24-inch white quartz ledge is exposed on the Claim. face of the cliff running N. 40° W., but apparently quite barren. A tunnel was started in about 10 feet to the right of this, and run in parallel with the ledge for 25 feet, when it cross-cut on an angle of 45° for 15 feet until the ledge was cut following it along 10 feet farther.

### McMURDO CREEK.

McMurdo Creek is the largest branch from the south, flowing into the North Fork of the Spillimachene River.

This district of country is reached by trail from Carbonate Landing, a distance of about 35 miles over a fair trail.

A new trail has been cut this last year, starting in from Bear Creek, on the C. P. Ry., following up Beaver River for a short distance, and then cutting over Prairie Mountain, but of this trail I can only speak from hearsay.

I got up the North Fork and on to McMurdo Creek on September 29th, when another and heavier fall of snow came, and I was only able to visit two claims. Such examination as I was able to make of these was very incomplete and, therefore, unsatisfactory.

Is a location on McMurdo Creek, at an elevation of 6,800 feet, belonging to H. Richardson *et al.* The country rock is slate, cut occasionally by igneous rocks. A 24-inch quartz ledge outcropped on a steep hillside, with a strike to the westward on the surface, but, as development progressed, the vein was found to turn off sharply to the south.

There is at present a 10-foot open cut, leading to a 10-foot tunnel, with a second smaller open cut above. At the surface there was a showing of several inches of solid galena, which is not as strong at the inner face, but the development is not sufficient to prove anything.

Some iron sulphides also occur in the quartz, and I saw free gold panned from the surface dirt, probably from the oxidization of these pyrites.

A location held by H. G. Low *et al.*, and is near the *I. X. L.* A 12-inch quartz vein is exposed, dipping into the hill at an angle of about 15°, with a strike N. and S. Very little work has been done on the property.

The quartz is mineralized with galena and iron sulphides, while the surface dirt will yield free gold in the pan.

### DONALD MINING DIVISION.

#### REPORT OF J. E. GRIFFITH, GOLD COMMISSIONER.

From Donald the trail leaves for the Northern country, down the Columbia to the Big Bend and up Canoe River to Tete Jaune Cache; the trail is completed to within 45 miles of the Cache, but as the balance is a fairly open country, not much trouble was encountered in getting through to the Fraser. Several prospectors, with exceptionally large outfits, are working there this winter, and from reports gathered, in all probability that section of the country is destined to prove valuable as a placer ground and good reports will probably be heard from there next spring.

Some very good prospects, carrying galena and copper ore, have been located close to Donald this year, giving wonderfully good assays, but as yet not sufficient work has been done to determine their actual value.

Considerable development has been done on the *Bald Mountain* property, consisting of ten claims, altogether some 300 feet of tunnelling; and a trial shipment was sent for a mill test, but the result I have been unable to learn.

The *Little Brother* group, bonded to Mr. Knowlton, has also been the scene of considerable activity, from which assays have been taken showing high values, although the ground appears to be pretty well broken up. With careful stripping and development work, it is expected good results will follow. Considerable development was done this fall and work will be continued in the spring.

#### OFFICE STATISTICS—DONALD DIVISION.

Free Miner's Certificates issued .....	36
Mineral Claims recorded .....	22
Placer Claims       " .....	1
Mineral Claim transfers .....	10
Placer Claim       " .....	1
Records of Assessment Work, mineral.....	24

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#### GOLDEN MINING DIVISION.

##### REPORT OF J. E. GRIFFITH, GOLD COMMISSIONER.

In the Division in general, there has been very little actual development work done this season (with one or two exceptions) beyond the necessary assessment work. All the well-known claims Crown-granted are no doubt held by the owners at high figures.

Considering the large area embraced in the McMurdo district, with 140 miles of trails and a large number of well-known claims, it is to be very much regretted that they are allowed to stand idle. The present state of affairs is liable to exist unless some energetic company proves beyond doubt that there is pay ore, then transportation facilities will no doubt be easily acquired.

Considerable work has been done in the Bugaboo district this summer, by the Golden and Fort Steele Development Company, at the head of the creek, where several claims are located showing mineral, and several tons of ore are now on the dump ready to ship.

Some trouble was caused by the water encountered in one of the tunnels, and probably a different system will have to be practiced in order to thoroughly test the property. The great distance from transportation facilities, in this case and many others, is of course a drawback, but will be overcome when sufficient work is done to prove the property. There is undoubtedly a good showing on the surface, from which assays have been obtained up to \$100 to the ton.

The *Balrath Group* is another property on which considerable work has been done, but is at present idle.

The *Certainty Group* has been bonded to Mr. Knowlton, and the *Porphyry* and *Iron Hill* to Mr. McIntosh, both of whom will commence work in the spring.

The *I. X. L.*, which is under bond to Vancouver parties, has very good surface indications. A 20-foot tunnel was driven on the lead, but enough work has not been done to demonstrate the actual worth of the property, although what ore there is in sight is of high grade.

A good deal of work has been done on the *Bennison Group* which is situated near the headwaters of the Beaver and distant about 33 miles from Bear Creek Station, on the C.P.R. This property is owned by the Kootenay Consolidated Mining Company, and is under the management of Major Clohecy, and is probably the most advanced of any of the claims in the

District as far as development work is concerned. The Government built a trail this past summer from Bear Creek Station, but there is still about five miles to be completed before the mine is reached ; possibly next summer may see it converted into a waggon road. The location is good and does away entirely with the different summits which were encountered by the old route up the Spillimachene.

The following report taken from the "Golden Era" is said to give a good account of the work done up to date:—The open cut on the Boston shows up a body of ore extending over a width of 32½ feet, the ore being galena interspersed with gray copper. At 100 feet below this cut a tunnel (No. 1) has been driven 192 feet. At a distance of 150 feet from the mouth it cuts the Boston lead and follows on the western wall of the ore-body which was exposed at the surface in the open cut. At a point 54 feet from the mouth, a vein of rich galena was cut. Two drifts have been run north-west from the tunnel, and one north-east, one of which cuts the Boston lead at 15 feet, another is in 64 feet and cuts a stringer which shows splendid ore. About 300 feet west of the tunnel an opening has been made on the western system of leads, which forms so prominent a feature of the property, and a tunnel has been run in on them for a distance of 35 feet. One of these leads is a contact vein, two to four feet wide, running with a porphyry dyke and is a particularly promising lead.

No. 2 tunnel is 750 feet below tunnel No. 1, and is run to develop the Bennison lead, a body of gold-bearing quartz. After running along this lead for 158 feet the tunnel crosscuts it, and the crosscut will be continued this summer to cut the Boston and other leads to the south-east ; this will practically develop the lead to a depth of a thousand feet.

Assays made on ore from the western system of veins show gold, silver, lead, and copper.

The property is now at that stage at which very little more work can be done till proper means of transportation are obtained, so that machinery can be got in and the property placed on a working basis.

The following work is also reported as having been done on Ottertail Creek :—29 feet of tunnel and 37 feet of shaft on the *Sunday Claim* ; and 70 feet of tunnel on the *Hercules*.

On the Middle Fork of the Spillimachene, 25 feet tunnelling on the *Ellen D.* ; 50 feet on the *Lincoln* ; 20 feet on the *Bryan* ; 40 feet on the *Lucky Jack* ; and 150 feet on the *Crown Point*.

#### OFFICE STATISTICS—DONALD DIVISION.

Free Miner's Certificates issued . . . . .	205
" " " to companies @ \$50 . . . . .	2
" " " " @ \$100 . . . . .	3
Records of Assessment Work recorded . . . . .	113
Payments instead of work . . . . .	5

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#### WINDERMERE MINING DIVISION.

##### REPORT BY J. E. GRIFFITH, GOLD COMMISSIONER.

There has been considerable activity in the Division this year, due not so much to actual development work as to the number of new locations with good surface showings, which have drawn considerable attention, resulting in several sales, offers, and bonds taken up and, in the ordinary course of events, next summer should see a big change in this Division.

There are many good locations on which no assessment work had to be done this year and it might be considered out of place to mention them before they are developed.

Considerable work has been done this year on the *Pretty Girl Group*, the property of the New Golden British Columbia, Limited, England. This group is situated on Boulder Creek, a tributary of Horse Thief. A tunnel has been driven in 235 feet, tapping the vein about 90 feet below the surface, where a shaft is being sunk on the ore to connect with the tunnel. This is a copper-silver proposition. A thousand pounds of the ore was shipped to England for a mill test, and is said to have run \$65 to the ton. Judging from the present indications, the outlook is very encouraging, and, in all probability, permanent camps will be put in next spring and development work continued on a larger scale. The same Company also own several other locations of a promising nature, but so far only assessment work has been done on them.

The *Hot Punch*, on North Fork Toby Creek, bonded to Messrs. Collett & Starbird, is looking well. An inclined shaft of 75 feet and a 35-foot tunnel have been driven. The quartz lead is about 4 feet in width, with a pay streak of 18 inches of solid galena, carrying copper and gold. The ledge is uncovered for about 500 feet, and shows ore the entire length.

The *Delphine Group*, on the same creek, owned by Messrs. Starke, Harrison & Kimpton, from present appearances is likely to turn out a very valuable property. The ore is galena, carrying gray copper, the pay streak being from 15 to 30 inches. Although practically very little actual development work has been done, 20 tons of ore were packed down to the Columbia River, but unfortunately too late to be shipped, on account of low water. Good buildings have been erected close to the claims, which are favourably located, and development work is to be vigorously carried on throughout the winter.

The *Swansea*, under the management of Mr. Mulholland, of Rossland, is also being worked this winter. A 140-foot tunnel has been driven, as well as a shaft sunk. About 4 tons of ore were shipped for a mill test. Considerable work has been done in the past on the property, but not of a systematic nature, but under the present management it will be thoroughly tested. The surface indications and assays are good.

The *Delos*, under the same management, from which splendid samples of copper ore have been taken out, is also being developed.

Mention might be made that several propositions have been bonded to Nelson and Spokane parties for large figures and on excellent terms, on which work will be done next spring, and undoubtedly some very good mines will be the result. They are in good hands, and there is every reason to believe that Toby and Horse Thief Creeks, and their tributaries, will soon be the scene of great activity.

It is to be regretted that at the time of the visit of the Provincial Mineralogist to the Division, a number of the claims, especially the new discoveries, were inaccessible, and that a good many were only recorded subsequently.

#### OFFICE STATISTICS—WINDERMERE DIVISION.

Free Miner's Certificates issued .....	71
Mineral Claims recorded .....	293
Records of Assessment Work .....	62
Bills of Sale, etc .....	84



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**SUMMARY.****NORTH-EAST KOOTENAY, 1898.**

Free Miner's Certificates issued .....	310
"          "          "    to companies @ \$50 .....	2
"          "          "          "    @ \$100 .....	5
Mineral Claims recorded .....	416
Placer Claims recorded .....	1
Records of Assessment Work .....	199
Payments in lieu of Work .....	5
Claims Crown-granted .....	6

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**WEST KOOTENAY DISTRICT.**

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**REVELSTOKE MINING DIVISION.**

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REPORT BY J. D. SIBBALD, GOLD COMMISSIONER.

I have the honour to submit for your information my report on the progress of mining development in this Division for the past year.

In order to place matters in as clear and practical a shape as possible, I shall start at a point in the Big Bend about 65 miles north of Revelstoke, and take in succession the different points at which active operations are going on.

**SMITH CREEK.**

On this creek, situated on the west side of the Columbia River, about a mile above Gold Stream, there are at present 4 placer leases legally held. This creek produces "colours" of gold anywhere on the surface of both slopes, but the difficulty, so far, has been the great depth to bed-rock, one leaseholder being down at least 100 feet and not on bed-rock yet. In all this depth "colours" of gold can be found in every foot of gravel, at times to a much greater extent than others, and the leaseholders are hopeful and are still pushing down for bed-rock. At the mouth of the creek the bed-rock, to the north of the stream, has been cleaned and some very coarse gold found, but this is not on the channel of the creek. The depth of bed-rock makes Smith Creek an hydraulic proposition, and if, when it is reached by the present shaft, a good showing is obtained, I look for a very active camp on this creek next year.

**MCCULLOCH CREEK.**

A large amount of work has been performed on this creek, and a great deal of gold has been taken out, but it requires capital to make it a paying proposition. During the year the Ophir bed-rock lease changed hands, and the purchasers are now arranging to put in an hydraulic plant, which will be at work next season with very great possibilities. There are four leases on this creek.

**CAMP CREEK.**

On this creek, a tributary of Gold Stream, there are three leases now held, the owners of which are preparing for work by putting in a flume.

**FRENCH CREEK.**

French Creek is another tributary of Gold Stream, on which the French Creek Hydraulic Company have put in a large plant. I am indebted to Mr. James M. Skeaff, the Engineer in charge, for the following report:—

"Preliminary surveys and investigations for construction of the plant were commenced May 26th of last year. Construction was commenced June 14th, and suspended for the season November 3rd. It was commenced again this year May 12th, as soon as weather would permit, and finished August 1st. Washing was commenced August 9th and continued (more or less interruptedly) until November 7th, when frost prevented further washing.

"The water for washing is taken from French Creek, through substantial head-works, by a 3½ x 4-foot flume, 12,200 feet long. Connected with the flume are 1,587 feet of wasteways.

The capacity of the flume is a little in excess of 75 cubic feet per second. On the flume line there are some heavy cuts, 3,151 feet of trestle from 2 to 40 feet high, 2 bridges (the larger 187 feet long and 90 feet high), and 2 tunnels, 5 x 5½ feet in the clear, and 100 feet and 279 feet in length. The elevation of the flume gives an excess of pressure at the mines; this was the result of obstacles to flume construction at a lower elevation. From a point near the end of the flume to bed-rock in the mine the elevation is 412 feet. A branch flume takes the water from the main flume at this point and conveys it to a penstock 45 feet long, at an elevation 112 feet lower, from which a pipe line 1,825 feet long conveys it to two No. 6 Giants in the mine. The bed-rock flume is 108 feet long, and is set in a rock excavation 30 feet deep in solid rim-rock. A derrick of 6 tons capacity, operated by a Pelton wheel, is used to remove the boulders in process of washing. To supply lumber for the construction of the plant, the Company built a saw-mill, with a capacity of 12,000 feet of lumber per day. The mill is operated by a turbine wheel supplied by water through a 600-foot flume. A logging flume 2,802 feet long was another adjunct to the saw-mill. This summer a boarding-house, sleeping houses for the men, storehouses, and office have been built of sawed lumber.

"The installation of the plant would have been well on to completion last Fall had there not been the many very serious delays caused by the lack of transportation facilities between Revelstoke, the base of supplies, and the mine, and the wretched condition of the trails, which was aggravated by an exceptionally wet season. Part of the supplies were packed the entire distance of 70 miles from Revelstoke to the mine. Towards the middle of the season, the Company succeeded in getting the C. P. R. to take four steamer loads of machinery and supplies from Revelstoke up the Columbia River to La Porte, about 46 miles, from whence it was packed to the mine on animals. Small boats were also employed between Revelstoke and La Porte. The Company had 50 pack animals of their own, besides 24 others under contract, and in addition, got some assistance from local packers. Last year the Company spent on pack-train outfit, packing and freight charges, between Revelstoke and the mine, about \$12,000.

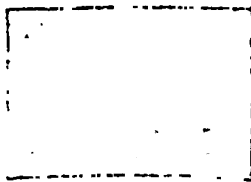
"This year the Company got the steamer "Lytton" to make three trips with additional machinery and supplies, from Revelstoke to La Porte, as soon as the river was high enough to take the steamer up, about the middle of May. Small boats were again employed in September and October to take provisions up for next spring, and some of the provisions were packed from Revelstoke to the mine to insure against delay. Packing and connected expenses to the mine, and river freight, cost about \$6,000. This is exclusive of railroad freight on machinery, etc. As washing was commenced towards the end of the season the Company did not expect much more from the mine than to shape the work and the ground and leave it in a more workable and systematized condition for the spring. But even under the circumstances better results would have been obtained had it not been for the serious lack of labour. Owing to this a night shift could not be run, and about three-quarters of the time since washing was commenced there was only a half-day shift. It is to be regretted that so heavy an investment as this Company has made on French Creek (which amounts to about \$100,000) for construction of plant alone and expenses directly connected with construction, exclusive of purchase price of property and operating expenses since washing commenced, that it should be jeopardized for lack of labour when there is supposed to be so much unemployed labour in the country, and when it is led to believe that such enterprises are hailed with enthusiasm to give labour employment and open a section of undeveloped country, which has been actually pioneered by this Company on the first large scale. Tent life is unavoidable during construction, but now the Company has comfortable warm buildings of ample size for its employees, and a boarding house stocked with the best provisions the country affords, and, as stated, it is a very



SINCLAIR HOT SPRINGS—NEAR WINDERMERE, N. E. K.



FROM INTERNATIONAL BASIN—MIDDLE FORK, SPILLIMACHENE.



serious drawback to this and similar investments that may follow, that labour will not take a better hold of this class of work when opportunity for work is afforded.

"When construction was finished and operating commenced, the Company began to systematically prospect the undeveloped part of their property, to the extent that the limited amount of labour would allow. This work will be continued next year until the whole of the property is thoroughly prospected."

On this creek are several other leases. Prominent among them is the *Consolation* which has taken out a large amount of gold by drifting on the bed-rock: in the last four or five years, I understand some \$30,000, in which some very coarse gold was obtained, one nugget as high, as \$50.

#### GOLD STREAM.

This creek is shallow diggings, and has been pretty well worked over, though gold is still taken out by "sniping," but not enough to justify any amount of work.

#### GROUND HOG BASIN.

This lies at the head of McCullough Creek, and contains many promising mineral claims; the ore being principally free milling quartz. The B. C. Alliance Syndicate have a number of properties said to be of a very promising nature. There are a great number of claims in this camp, but so far the bulk of the work done has been in surveys; prominent among the locations are the *Orphan Boy*, *Homestake*, *Last Chance*, *Roseberry*, *Rocket*, *C. O. D.*, *O. K.*, *Gold Hill*, *Gem*, *Ground Hog*, *Ole Bull*, *Kesef*, *Big Bend Belle*, *Alice*, *Bonanza King*, *Keystone*, *Gaspe*, and *Heather Fraction*. Work, to any extent, has only been done on the *Ole Bull* and *Orphan Boy*.

#### KEYSTONE MOUNTAIN.

This camp had its first locations made in 1895, but owing to lack of transportation facilities has not developed very fast; it is situated about 40 miles north of Revelstoke, and has a large number of claims (about sixty). The principal work has been assessment, with the exception of two groups on which about 300 feet of tunnel have been run, of which 200 feet are on the *Carbonate Chief* and 100 feet on the *Keystone*, and preparations are now being made to work several claims this coming winter. The character of the ore is arsenical iron, carrying gold, copper, galena, and copper pyrites. The iron leads are generally heavily capped, showing strong and continuous veins. Lead ores run from 60 to 80 per cent. lead and as high as 80 oz. in silver.

The *Standard Basin Group* adjoins Keystone Mountain on the east side, and has some 20 claims; the first located a year ago. This year only assessment work, and preparatory work for more active development another season, was done. The ore is composed of arsenical iron and copper pyrites, the copper predominating. On the *Standard* claim a cross-cut of 60 feet has been run and a chamber excavated and ready for sinking. The formation is lime, serpentine and shale, with dykes of porphyry and granite. This promises to be a good camp, with development. A trail was built this year to connect the camp with the Keystone Trail.

#### CARNES CREEK.

On this creek are located the well known group, consisting of the *Roseberry*, *Empire Fraction*, *Salisbury*, *Arsenic*, *Jubilee Fraction*, *Kingston*, *Coronation*, and *Imperial*, all owned by the "Carnes Creek Consolidated Company, Limited," and situated on the North Fork of Carnes Creek, easily accessible from the Columbia River.

The work on this group is principally on the *Roseberry*, and consists of 361 feet of tunnel and shaft. On the *Roseberry* there is a width of 50 feet well mineralized, containing good values in gold, which can probably be made to pay to work. Within this belt is a vein, averaging about 5 feet in width, containing concentrated ore of much higher value. The vein has been drifted on for 130 feet on one level, and 75 feet at 100 feet lower. In the upper level, there is exposed about 18 inches of clean ore, assaying well in gold, and the face of the lower drift is all in similar ore. The work on the adjoining claims proves that this mineral belt continues for several claims. This group has apparently a great future before it. The character of the ore is arsenical iron. There are a number of promising claims in this camp, but not much development.

#### LAFORME CREEK.

This creek runs into the Columbia River about 20 miles from Revelstoke. Within the last two seasons a large number of claims have been located, the ore being galena, copper and sulphides of iron. This latter ore is much like that of Rossland in appearance and carries gold values. The galena runs about 50 ounces in silver, 70 to 80 % lead. This is a very desirable locality on account of the facilities for transportation. A majority of the mineral claims on this creek are situated on the north slope of the North Fork, and are reached by 27 miles of pack trail, 20 miles on the Big Bend main trail, and 7 miles up Laforme Creek.

Through a large number of these claims and running nearly east and west is a well-defined vein between the limestone and schists. The vein is made up of iron pyrites and mispickel, with quartz gangue. The ore is in 4 bands, which together aggregate about 3 feet in width. Running parallel with this is a ledge of white quartz 3 feet wide, well mineralized. Both these veins can be traced through the *Adair Group* (5 claims) and the *Uncle Jar Claim*, and I am informed that they have been found on several claims lying to the east of the *Uncle Jar*. On some of the claims to the west of the *Adair Group* there is a galena ledge.

#### JORDAN PASS.

To the west of Revelstoke, on Jordan Creek, a number of claims have been located. The ledges are large and well defined; the grade of ore varies, but so far generally low grade. The principal claims are about 12 miles from the Columbia, and 13 miles from Revelstoke. The owners of these claims have a very high estimate of them, and say that all they require is a road, in order to develop them thoroughly.

#### REVELSTOKE.

On the hill back of the town is a location called the *Sultana*, which the owners are working on now. The prospect is gold. The owners are pushing in a drift, and the ledge improves as they get in.

#### ISAAC CREEK.

This is a promising camp of very large veins of arsenical iron ore, carrying gold. There are quite a number of claims in this camp, which is located about 8 miles from the Arrowhead branch of the C. P. R., on Isaac Creek, which enters the Columbia about 16 miles south of Revelstoke.

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The following are the yearly statistics of Revelstoke Mining Division, as reported by Mr. W. G. Paxton, Mining Recorder:—

LIST OF RECORDS OF CLAIMS LOCATED DURING YEAR 1898 (UP TO AND INCLUDING 7TH NOV.)

French Creek .....	5
Downie Creek .....	23
McCullough Creek .....	12
Carnes Creek .....	19
Revelstoke (vicinity) .....	6
Jordan River .....	4
Keystone Mountain .....	37
Isaac Creek .....	24
Laforme Creek .....	11
Smith Creek .....	8
Standard Basin .....	2
Big Lime Creek .....	9
Ground Hog Basin .....	2
Graham Creek .....	6
Total .....	168

RECORDS, VARIOUS.

Bills of sale, mineral claims .....	65
Do. placer claims .....	6
Permissions .....	15
Abandonments .....	3
Placer leases granted .....	19
Free miner's certificates issued .....	365

LIST OF RECORDS OF CERTIFICATES OF WORK GRANTED DURING YEAR 1898 (UP TO AND INCLUDING 7TH NOV.)

French Creek .....	7
Downie Creek .....	47
McCullough Creek .....	21
Carnes Creek .....	22
Keystone Mountain .....	17
Isaac Creek .....	8
Laforme Creek .....	21
Ground Hog Basin .....	5
Lakeview Mountain .....	1
Camp Creek .....	1
Revelstoke (vicinity) .....	1
Total .....	151

LIST OF RECORDS OF CERTIFICATES OF IMPROVEMENTS GRANTED DURING ABOVE PERIOD OF 1898.

McCullough Creek .....	9
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NOTE.—Eight claims on Carnes Creek are at present being advertised, with a view of obtaining Certificates of Improvement for same.



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 REVENUE OF REVELSTOKE MINING DIVISION FROM 2ND JANUARY TO 30TH NOVEMBER, 1898.

Free miners' certificates .....	\$3,049 00
Mining receipts general .....	3,742 70
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	\$6,791 70

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 ILLECILLEWAET MINING DIVISION.
 

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## REPORT BY J. D. SIBBALD, GOLD COMMISSIONER.

The *Donald* and *Roundhill* claims, owned by Woolsey and Caldwell, have an excellent surface showing, and a shaft sunk for 80 feet on the ledge shows a large body of galena ore, but so far of low grade. This claim is 5 miles from Illecillewaet and 3 miles up Flat Creek. Adjoining these are the *Maple* and *Gracie* claims, owned by Robert Jewell. There are quite a large number of claims in this Division, on which 30 had assessments recorded this year, and 36 new claims were recorded.

Up about 28 miles from the station of Albert Canyon, on the main line of the C. P. R. are situated the *Waverley* and *Tangier* mines, the property of the Gold Fields of B. C. Limited, on which, I am informed, a great amount of work has been performed, but, owing the lack of definite information, I am unable to give the extent. There are several other claims I have not before mentioned in the Illecillewaet Division on which work has been also done, viz. :—

The *Laurier* Mineral Claim, which has a tunnel driven 125 feet on the vein, which will be continued 200 feet this winter. The property is situated one mile east of Illecillewaet and 1,100 feet south of the C. P. R. track. The claim is owned by A. Chilberg.

*Sanquhar* and *Summit Lode* Mineral Claims have a shaft sunk on the vein 17 feet, a tunnel to tap the vein 108 feet, and a drift on the vein 32 feet. They are situated 3 miles north of Illecillewaet, and are owned by Walter Scott and Andrew Stenstrom.

*Elkhorn* Mineral Claim adjoins the *Sanquhar Lode*. There are several small open cuts on the vein, all showing high grade, gray copper ore, with a drift on the vein of 30 feet, which shows from 3 to 8 inches of high grade ore. Situated on the east branch of the North Fork of the Illecillewaet River; owner, Benjamin Green.

*Big Horn* Mineral Claim has three open cuts, showing high grade ore. A tunnel, 119 feet, has been run to tap the vein.

*George* and *Reggie* Mineral Claim, situated on the North Fork of the Illecillewaet, 21 miles from Albert Canyon, and 400 feet from the waggon road. The vein has been stripped about 200 feet; several cuts have been made on the vein, and a cross-cut of 150 feet.

There are also in this vicinity a number of other promising prospects belonging to private parties.

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LARDEAU MINING DIVISION.

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## REPORT BY J. D. SIBBALD, GOLD COMMISSIONER.

Lardeau Mining Division takes in the east and west of Arrow Lake from Arrowhead down to within a few miles of Nakusp, and up the east arm of the lake to Thomson's Landing, taking Fish Creek, and the tributaries of Pool Creek, Lexington Creek, Boyd Creek, and Kellie Creek to the south-east, and McDougall, McRae, Sable, and Menhenick Creeks to the north-west.

## PINGSTON CREEK,

This creek running into the Arrow Lakes, directly across from the St. Leon Springs, has a number of very promising claims, which are gold properties of the arsenical iron character. There has been considerable development work done on some of these properties, but no shipments so far.

Prominent among the claims on this creek are the *Canada Jay*, *Blue Grouse*, and *Laughing Gull*, about 4 miles from deep water. There are, in all, 23 recorded claims on the creek. A tunnel has been driven on the vein 25 feet, exposing 8 feet of massive pyrrhotite. The *Snowshoe Group*, near Pingston Creek, has a tunnel of 200 feet, with excellent showing of ore.

The location of this group is on the north-east arm of the lake, and is  
Great Western owned by the Great Western Mining Company, Limited. The ore is  
Group. galena, and it is a concentrating proposition, and is located within a mile  
of deep water.

## BOYD CREEK.

There are a large number of claims on this Creek, some of which are very promising. Among them can be placed the *Kootenay Chief Group*, comprising the *Kootenay Chief*, *Winnipeg*, and *Tarmacan*. On the *Kootenay Chief*, a tunnel has been run 35 feet, and there are several tons of good shipping ore on the dump. On the *Winnipeg*, a drift on the ledge exposes a vein of 8 inches of solid galena for full length of drift. Another promising property on the same ledge, is the *Anaconda*, which has a tunnel of 91 feet. Assays running well in gold and copper have been obtained from this claim. The formation is schist and lime; a large lime dyke extending through the country, traceable for miles.

## LEXINGTON CREEK,

A tributary of Fish River. There are a number of promising claims on this creek, but owing to poor transportation facilities there has not been a great deal of development work done. The bodies of ore are large, but the grade is too low for shipment under present conditions.

The *Nellie Group* consists of three claims. An incline was sunk on the *Nellie*, and a cross-cut at the foot of the incline, a total of 60 feet. The other claims in this group are the *Kitty* and the *Empress*. The face of the cross-cut on the *Nellie* is in concentrating ore.

## POOL AND MOHAWK CREEKS.

Pool Creek empties into Fish River, and Mohawk into Pool Creek. This is one of the most promising parts of Lardeau, and contains a large number of locations, and some very promising prospects are being opened. The *Beatrice Group*, one of the later discoveries, is working a number of men this winter. The character of the ore is argentiferous galena, carrying gray copper and a percentage of zinc. There are said to be about 200 tons of ore on

the dump. The work on this claim consists of a breast about 40 feet long and 10 feet high, a shaft 35 feet deep, and a drift on the ledge about 20 feet. The width of ore on the surface is about 9 feet. They have packed some ore out, but the transportation is of such a character that it will not pay unless better facilities can be obtained. There are four claims in this group, viz.: *Beatrice*, *Edmond*, *Florence*, and *Folsom*. They are now preparing to rawhide the ore out.

Other promising claims on Pool and Mohawk Creeks are:—

*Black Bear*, showing well on surface, but little work done so far.

*Brunswick*, discovered last summer, has a large amount of clean ore in sight; was sold by original locators to Lardeau-Goldsmith Company; has five men at work this winter.

*Mohawk*. This claim is at the junction of Pool and Mohawk Creeks, and has a good showing of galena ore, carrying sulphides of iron and copper; also values in silver and gold. Very little work was done on it at the time I saw it.

*Carbonate Hill Group*, Mohawk Creek. This group is near the *Beatrice*, and consists of the *Carbonate Hill*, *Silver Dollar* and *Old Abe*. A tunnel has been run, exposing a fine vein of ore similar to the *Beatrice*.

*Copper King Group*. This has a strong vein consisting of copper pyrites, but is low grade in gold and silver.

#### SABLE CREEK

Has some promising properties. The *Agnes*, owned by the Consolidated Sable Creek Mining Company, has a 40-foot tunnel, and the vein is stripped in several places. This company has spent several thousand dollars in development work.

*Sunset*, on Scott Creek, a tributary of Fish River, has a shaft sunk 60 feet deep, and a tunnel 25 feet. In both, working stringers of very high grade ore have been encountered.

*The Revenue*, a good prospect, sold a few weeks ago to Mr. Otto Abeling.

*Lost Cup*. This is a new strike made this summer, and was sold immediately on discovery to some parties in Rossland, who have six men at work opening it up. A cabin has been built and supplies packed in sufficient to last all winter.

#### OFFICE STATISTICS—LARDEAU DIVISION.

The following business was transacted at the Lardeau Office in 1897-98:—

Claims recorded . . . . .	407
Free miners' certificates issued . . . . .	123
Certificates of work issued . . . . .	79
Transfers . . . . .	133

There were 552 claims recorded at this office from 31st May, 1897, to 31st October, 1898.

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#### TROUT LAKE MINING DIVISION.

##### REPORT BY J. D. SIBBALD, GOLD COMMISSIONER.

This camp only requires transportation facilities to make it a most important one, but owing to the lack of the same progress is materially retarded. There is a waggon road from the Arrow Lakes into Trout Lake, Ferguson and Ten-mile.

One of the officers of the "Sunshine, Limited," has kindly furnished me with the following information about the *Silver Cup Group* which consists of four full claims, viz.:—*Silver Cup*, *Sunshine*, *Excelsior*, and *Mountain*, and four fractional claims, viz.:—*Silver Cup Fraction*, *Excelsior Fraction*, *Mountain Fraction* and the *Silver Side Fraction*.

The principal development has been done on the *Silver Cup* claim, upon which some 2,000 feet of work in all has been prosecuted. The development consists of a cross-cut tunnel, 415 feet long, which connects, when in a distance of 350 feet, with the lower part of the main shaft, 185 feet deep, sunk on what is known as the *Silver Cup* vein above the tunnel. From the point of intersection, drifts have been run on this vein about N. W. and S. E., some 80 feet and 211 feet respectively, and considerable bodies of high grade and concentrating ore have been developed.

Before cutting the *Silver Cup* vein, the cross-cut tunnel encountered, when in a distance of about 300 feet, another vein known as the *Big Vein*, which has turned out to be of very great value. Drifts have been run about N.W. and S.E., on such vein at this level, for distances of 163 and 231 feet respectively, showing up a large body of ore.

From the north-west drift, on the level of the cross-cut tunnel, on the *Big Vein*, a winze has been sunk in ore a distance of 50 feet, and drifts on the vein, N. W. and S. E. for 33 and 73 feet respectively, have been run from the bottom of such winze, also showing up a large ore-body. Some 450 feet from the main cross-cut tunnel, and 130 feet vertically lower down the mountain, another cross-cut tunnel is now being driven and has reached a distance of 270 feet. When in 250 feet, such cross-cut (which has not yet reached the hanging-wall) intersected the *Big Vein*, which proved at this point to also carry ore of a very high value. The cross-cut is being continued towards *Silver Cup* vein, and to another vein beyond it. It is also the intention to drift from the new cross-cut on the various veins, and later to connect such drifts, by means of upraises, with the higher levels.

The depth attained on the property is now about 350 feet, and the veins may be said to have been actually proved for a length of about 700 feet.

In addition to the above workings, various small cross-cuts and upraises have been made.

The *Sunshine* property is situated immediately below the *Silver Cup*. Here a drift has been run on the vein for a distance of about 279 feet, on what seems to be a continuation of the *Silver Cup* vein. Two bodies of ore have been passed through, of the same character as the *Silver Cup* ore, and there is every indication to show that development will prove the property to be of value. During the last few months 650 tons of ore have been shipped from the *Silver Cup* and *Sunshine* properties, about 630 from the former and 20 from the latter. Such ore has yielded (all freight charges from Thomson's Landing, duty and treatment charges deducted) about \$68,350. The ore has averaged just upon \$150 to the ton, and consists of argentiferous galena, carrying a high value in silver and good values in gold and lead.

The Great Northern Group. Consists of *Silver Queen*, *True Fissure*, *Great Northern*, *Hillside*, *Broadview*, *Old Sonoma*, *Philipsburg*, *Alpha*, *Northern Light*, *North Land*, *St. Elmo*, *Yankee*, and *Copper Chief*.

The *Broadview* has several hundred feet of tunnels and shafts.

*Old Sonoma* has a 30-foot shaft, and one tunnel 64 feet in length. Some very good ore has been taken out of this claim, carrying gray copper.

*Great Northern* and *Hillside* have three tunnels, 164, 83 and 30 feet respectively.

*True Fissure* has one tunnel 84 feet long, and an open cut 20 x 30, showing ore.

*Silver Queen* has two open cuts showing a body of ore, but requires development.

*St. Elmo* and *Yankee* has a 20-foot tunnel cutting an 18-inch lead from which good assays were obtained.

The following report furnished by Mr. T. Taylor, Mining Recorder at Trout Lake, gives fuller particulars of this Mining Division:—

I have the honour to submit herewith my annual report of the mining industry of the Trout Lake Mining Division.

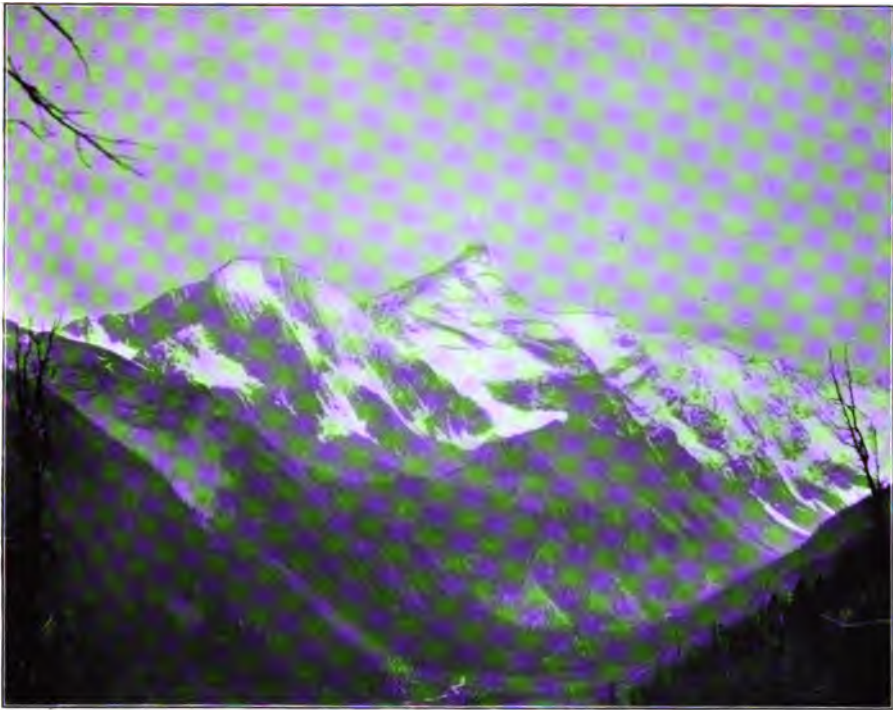
Mineral Claims recorded .....	370
Placer Claims recorded .....	1
Leases applied for.....	1
Leases held .....	2
Certificates of Work recorded.....	440
Bills of Sale, agreements, etc.....	227
Revenue collected from the sale of Free Miner's Certificates....	\$1,460 00
Revenue collected from Mining Receipts issued .....	3,777 10

With the exception of a few of the older properties, the bulk of the work and development done since last report, consists generally of little more than the annual assessment work required by the "Mineral Act," and until such time as transportation rates become cheaper, we can hardly look forward to anything different. There are undoubtedly a number of properties that could ship ore at the present high freighting charges at a profit, as has already been proved, but on the other hand, in certain localities quite accessible by railroads, where large bodies are known to exist, the grade of ore is not sufficiently high to stand handling at the present rate, consequently it is hoped that the current rumors of railroad communication will soon assume some definite shape and materialize in something more substantial than mere prophecy. Transportation is undoubtedly a consideration of paramount importance towards the opening and speedy development of all mining sections, and the almost phenomenal growth of Rossland, Slocan, and other mining camps in the near neighbourhood, can be attributed in a great measure to the advent of the railroad, and consequent reduction of transportation charges.

Adjoins the *Silver Cup* on the south-east, and is developed by a tunnel  
**Free Coinage.** 550 feet in length. At a distance of 182 feet from the mouth of the tunnel an upraise has been carried to the surface for ventilation. At a further distance of four hundred feet another upraise has been started, the ore at this point showing up very nicely, consisting of a pay streak of about 8 inches of galena, and a body of iron pyrites which carries gold values. The ledge has also been cross-cut in several places, the pay ore being found principally on the foot-wall. Several good-sized ore chutes have been cut through during the progress of development, but no effort has been made to ship, the management preferring to wait until transportation facilities improve.

**Copper Glance.** Joins the *Free Coinage* on the south-east and has a very large lead, but not sufficient development work done to give any results.

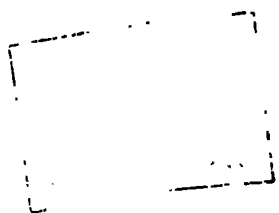
Is a south-east extension of the *Copper Glance* and is under bond to a  
**Morning Star.** Rossland Company, which is completing arrangements towards a systematic development of the claim. The ledge has been cut through in several places on and near the surface. The pay ore is found to be contained in small veins lying alongside the foot-wall.



MOUNT ST. THOMAS—FROM "PRETTY GIRL" CABIN, N. E. K.



SINCLAIR PASS—THROUGH THE ROCKIES—NEAR WINDERMERE, E. K.



Is situated at the head of 8-Mile Creek, a tributary of Trout Lake, The Mable Group, and about two and one-half miles south-east of the *Silver Cup*, and comprises the *Mable*, *Virginian*, *Nora Lee*, *Rainy Lake*, and *Golden Gate* mineral claims. A cross-cut taps the lead on the *Mable* at a considerable depth, and the vein found to be about four feet wide, about two feet being a concentrating galena ore, carrying a little copper and a six-inch streak of carbonates. Adjoining the *Mable* on a parallel lead is another group of claims, among them the *Alice*, which has given high assays in gold. Very little development is done on any of the claims in this group. Continuing on the *Mable* lead are the *Silver Cord*, *I. X. L.*, *Silver Plate*, and *John L.*, all very promising looking prospects, but have very little development work done.

The *American* is situated at the head of Haskins Creek, a tributary of Healey Creek. This claim has a very strong lead of galena ore. About 60 feet of drifts and open cuts have been run, showing 14 inches of galena. This property is under bond to a Rossland company. A good trail leads up to the claim from Trout Lake, a distance of four miles.

The *Black Diamond* and *Copper Leaf* are situated about one mile south-east of the *American*. The vein has been cut at a depth of twenty-five feet, showing about fifteen inches of galena ore and quartz lying between the slate and lime walls.

On Healey Creek and Hope Creek, tributaries of the Lower Lardeau River, a great number of locations have been made on which very little work has been done. The *Pawnbroker* and *Alberton* have good surface showings.

The *J. C.* group, of five claims, at the head of Lake Creek, has a vein of five feet of concentrating galena ore. A cross-cut taps the *J. C.* vein at a depth of 50 feet. Here the ore is coming in better.

The *Crown Point Group*, comprising the *Crown Point*, *Will Cornock*, *Three Lakes*, and *Black Bear* claims is situated on the east side of the Lower Lardeau River, near Hope Creek. A strong iron-capped ledge is found to traverse this group, but the work done has not been sufficient to give any results. Assays taken from the croppings have given some very good results in gold.

On Poplar Creek, also a tributary of the Lower Lardeau River from the south-west, are several recent locations which should produce good results on development, particularly the *Wandalia*, *Nora*, *Brooklyn*, *Poplar*, *Hecla*, and *Copperhead*. A strong ledge can be traced through this group of claims for upwards of a mile, carrying gray copper and galena ore.

At the head-waters of the South Fork of Canyon Creek are several groups of claims. The *Black Jack Group* comprises the *Silver Crown*, *Black Jack*, *Pedro*, and *Grand Solo*. On the *Pedro*, two veins are traced for several hundred feet, the upper lead being from 2½ to 3 feet wide, and the lower one 2 feet wide. The development work has not attained any depth, but the surface appearance is very encouraging. The ore is galena, impregnated with gray copper. The *Columbia* and *Latton Groups*, near by, comprise in all ten full claims. On the *Latton*, an incline shaft is sunk to a depth of 82 feet, the upper part of which is in a vein of concentrating galena ore. After sinking to a depth of 20 feet, the vein straightens up, and the work of running a cross-cut from the bottom of the shaft to tap the vein has begun. On the *Columbia*, a shaft has been sunk on the lead for 66 feet.

The *Brooklyn Group* of three claims is also situated in this locality. On the *Brantford*, in this group, a cross-cut is run for some 40 feet, which, it is presumed, will have to be carried forward another 50 feet before encountering the vein. On the surface the lead protrudes in several places, and lies between granite and slate walls. Some high grade copper ore is found on the surface,



## FIVE-MILE CREEK.

The *Silver Bell Group*, at the head of Five-Mile Creek, comprises the *Silver Bell*, *Stella*, *Norway*, and *Hopperanda*. On the *Silver Bell* the shaft is sunk on the vein for a depth of 25 feet in concentrating ore. On the *Norway* a cross-cut taps the lead at 100 feet. The vein is here 6 feet wide and has several seams of solid galena and iron pyrites.

The *Bonanza King Group* of five claims is also on Five-Mile Creek. A cross-cut is run for 25 feet, and two open cuts on the surface are 15 and 18 feet long, respectively. The vein is about three feet wide and is well mineralized.

## FOUR-MILE CREEK.

The *Jumbo Group*, on Four-Mile Creek, comprises the *Jumbo*, *Homestake*, *Cyclone*, *Hidden Treasure*, *Independent*, and *Big Four*. Two cross-cuts are run on the *Jumbo*, 30 and 60 feet long, respectively. The lead is also stripped on the surface for a distance of 40 feet. In the No. 1 tunnel a vein is exposed carrying about 3 feet of concentrating ore, and a small seam of carbonates. The No. 2 tunnel is not yet into the ledge.

A number of other locations have been made in this locality, but no work has been done on them.

## GLACIER CREEK.

On Glacier Creek, which empties into Trout Lake, is the *Ethel Group*, comprising the *Ethel*, *Esther*, and *Keystone*. A good trail is built from Trout Lake City to the mines, a distance of three and one-half miles. The property is under bond to the Commonwealth Mining and Development Company. A force of fifteen men are developing the *Ethel* by drifting on the ledge, at depths of 100, 200 and 300 feet. No. 1 drift is in 70 feet, where a cross-cut is run to the foot-wall, and a vein of carbonates of 12 inches was found. A winze is being sunk on this vein, which will eventually connect with the lower workings and give ventilation to the mine. The ledge matter encountered consists of white quartz, steel galena, gray copper, and carbonates, and the walls are of slate.

No. 2 drift is in 68 feet, and a cross-cut is here run through the ledge to the foot-wall, a distance of twelve feet. On the foot-wall a vein of 12 inches of galena and gray copper ore was exposed. The drift is now continuing along the foot-wall, and the vein of galena still continues.

No. 3 drift, at a depth of 300 feet, is just in 30 feet, and the galena is here coming in in small stringers about 1 inch wide.

A trial shipment of a few tons of ore was made some months since as a test of the entire ledge in No. 1 drift, and the result is said to have been \$70 per ton in silver. The ledge at the lowest depth attained is said to be fully 12 feet wide. The ore in the upper drift is mostly carbonates, while in No. 2 and No. 3 drifts it is found to be principally galena.

A rawhide trail is completed to Trout Lake City, and it is the intention of the management to commence rawhiding ore at once. Active development work will be continued all the winter season. Two ore-houses, a bunk-house, cook-house, blacksmith shop and assay office have been erected at the mine.

The *Klondyke group*, near the head-waters of Glacier Creek, 4 miles from Trout Lake comprises 4 claims. A shaft is sunk on the lead for 25 feet, and the vein is stripped on the surface 40 feet. The ledge is 4 feet wide, and carries from 6 to 8 inches of carbonates. A good trail leading to the group connects with the *Ethel* trail about 2 miles from Trout Lake

The *Homestake* group of 4 claims is situated about half a mile from *Ethel* group. The development work consists of a cross-cut of 65 feet, where the vein was encountered, and a drift extended on the vein for 20 feet. The ledge has a width of about 4 feet, of which about 4 inches is carbonated. A good trail is also built to this group.

#### TROUT CREEK.

The *Big Hope*, *Bright Star*, and *Sunny South* are situated on Trout Creek, 4 miles from Trout Lake. A cross-cut is in for 47 feet on the *Big Hope*, but the ledge has not yet been encountered. *Copper Stain*, *Peacock*, and *Copper Chief*, on Trout Creek, have a very strong lead traversing them, with a heavy iron cropping, which is found to carry values in gold.

The *Molybdenum* and *Prodigal* claims are also on Trout Creek, 2½ miles from Trout Lake. Five small veins are found on these claims of molybdenite. Copper pyrites and galena, with a gangue of quartz and feldspar, in a ledge about 10 feet wide.

The *Beta*, *Rubicon*, *Evergreen*, *Windthrop*, and *Granite Butte* groups are also on Trout Creek, but not developed.

#### NORTH FORK OF LARDEAU CREEK.

*True Fissure* joins the *Great Northern* mining claim on the north, and has a cross-cut driven in a distance of 80 feet, and the ledge is also stripped on the surface for some distance. The *Silver Queen* is a northerly extension of the *True Fissure*, and is developed by a tunnel cross-cutting the formation for a distance of 170 feet, the last 7 feet of which is in ore, consisting of small seams of iron pyrites and galena.

The *Yankee* and *St. Elmo* are on a parallel ledge, and joining the side lines of the *Silver Queen* and *True Fissure*, respectively. On the *St. Elmo* a drift is run near the surface for 60 feet on a vein of carbonates and galena ore from 8 to 14 inches thick. At a further depth of 50 feet, a drift is run on the vein for 45 feet, which has followed the seam of galena and gray copper ore for over 40 feet. In the face of the drift which is now being pushed ahead, the seam has increased in size. A rawhide trail has just been completed, and the ore is being brought down over this for a distance of 7 miles to the Trout Lake Waggon Road.

Continuing from the *Great Northern* ledge for a distance of upwards of 2 miles past the head of Goat, and over the divide to the Lardeau Mining Division (where the chain is further continued), is an almost continuous chain of claims, mostly recent locations and undeveloped. On the *Horne* ledge and North Fork of Lardeau a great number of locations are made, among which may be mentioned the *Glenside Group*, *Horne*, *Silver King*, *Jenny Lind*, *Sunshine*, *Yankee Girl*, *Canadian Girl*, *Centre Star*, *Celtic*, *Morning Star*, *Rob Roy*, *Highland Chief*, and so forth. A strong lead is found cutting through all the above-mentioned claims, with a heavy iron capping. With the exception of the *Glenside* group, they are almost entirely undeveloped.

On the *Glenside* claim, three quartz and galena ledges can be traced  
Glenside Group. from Lardeau Creek to a point about 1,000 feet distant, where they unite in one strong ledge which traverses the country for miles. At a point about 500 feet below where the three ledges unite, a tunnel is in a distance of eighty feet, on the centre small lead. It is the intention to follow this lead to the point of convergence of the three leads. An open cut is also run for twenty feet at the point of convergence of the leads, which, after cutting through the iron capping, exposed a vein of well mineralized quartz with stringers of galena, for some distance.

Comprises the *Vera*, *Alberta*, and *Jessie* mineral claims, and is situated on Surprise Creek, a tributary of the North Fork of the Lardeau. A cross-cut is run on the *Vera* 180 feet. Two ledges were traced on the surface, running parallel to one another and about 100 feet distant. In driving the cross-cut the first and small ledge was tapped, when in a distance of one hundred and twenty feet, and found to be about four feet wide and composed of quartz, iron pyrites, and a small seam of galena. The cross-cut will be pushed through another 25 feet, when it is expected a larger vein will be encountered. This property, as well as the *Glenside* group, belongs to the "Commonwealth Mining and Development Company."

Is composed of five full claims, and is situated at the extreme head of the North Fork of Lardeau Creek. These leads are traced for a considerable distance, running parallel to one another at intervals of about 250 feet. No. 1 lead has been stripped of surface wash for about 60 feet, the ledge being about four feet wide, with 18 inches of concentrating ore, and 4 inches of galena. No. 2 lead was found to be about 8 feet wide, with lime and slate wall consisting of gray quartz impregnated with gray copper and galena. No. 3 lead can be traced for a distance of three claims, and a cross-cut, at a depth of thirty feet, has developed a four-inch vein of galena ore in a ledge three feet wide.

#### DUNCAN RIVER TRIBUTARIES.

Of three claims, situated at the head-waters of Silver Tip Creek, which empties into the Duncan River. Two ledges, lying between slate and lime walls, are found in this group. On the upper vein a cross-cut is run and passes through the ledge at a depth of thirty feet, where the vein is found to be three and one-half feet wide, with 8 inches of galena and 4 inches of copper ore on the wall. The grade of the carbonate ore is especially high. On the lower ledge the vein is stripped for about two hundred feet. The ledge is about five feet wide, and has about nine inches of ore, principally carbonates. This group is the property of the "Silver Tip Mining Company," of Rossland.

Is a continuation of the *Black Diamond* lead to the north-west. The *Little Robert* group of three claims, is on a parallel ledge to and joins the *Black Diamond* group. *Black Warrior*, *Eva May*, and *White Star* are at the head of McDonald Creek, a tributary of Duncan River. On the *Black Warrior* a drift is run on the vein for about sixty feet, near the surface, and carries about twelve inches of quartz. A cross-cut to tap the ledge at 100 feet depth, is run for 30 feet.

Is composed of the *Glengarry*, *Prince Edward*, *Banwell Fraction*, and *Dewey* mineral claims, and is situated on the divide between Boyd and Silver Tip Creeks. The first two mentioned were located in 1892, but owing to the difficulty of getting in, only assessment work was done until 1897, by which time a trail was opened through to the property and more active operations commenced. The development, so far, is principally on the *Glengarry*, where the large ledge, of 15 feet wide, is stripped for 100 feet, showing about 28 inches of galena, and galena and copper more or less through the balance of the ledge. At a depth of 40 feet from the apex of the main croppings, a cross-cut has been run cutting the ledge (length of cross-cut 25 feet), and a drift on the ledge, 22 feet. At the end of the drift a winze is started on two feet of ore, of which twelve inches is galena and twelve inches carbonates. The gangue in the winze is composed of quartz and calc spar, carrying small seams of clean galena through it, from  $\frac{1}{2}$  inch to 1 inch in thickness. A test shipment was made this summer of 1 ton to Tacoma smelter. There are twelve

tons of ore on the dump. This property has good prospects, and work will be pushed on the claims as early as possible in the spring. With improved transportation facilities, I believe this will become a producer.

Situated on the West Fork of the Duncan River, comprise in all twelve Silver King and claims, and are the property of the Old Gold Placer and Quartz Mining Silver Queen Company, of Rossland. The ledge has been pretty thoroughly prospected on Groups, the surface, by stripping and small cross-cuts at different points. A shaft is sunk on the *Silver Queen* to a depth of 50 feet, and the lead is found to be about 7 feet wide with 18 inches of ore; the balance of the lead is mostly gray quartz with a little galena. A trial shipment of a few tons has just been forwarded for treatment. A cross-cut on the *Silver Queen*, the adjoining claim, is now in 150 feet.

The *Primrose Gold Mining Company*, of Rossland, are the owners of some promising claims in this locality, particularly the *Endora* and *Grace C.*

Comprising the *Olive Mabel*, *Foundation*, *Little Fred*, *Goldenville*, *Lade Group*, *Annie L*, and *Waverly*, are situated at the head-waters of Gainer Creek.

This group of claims is particularly remarkable on account of being the first discovery of free gold throughout the Division. The work done, which has not extended beyond the surface, consists altogether of cribbing, and small cross-cuts, principally on the *Olive Mabel*, and has disclosed several small veins, varying from 1 inch to 12 inches, cutting diagonally across the formation, and in which it is reported native gold and tellurides are met with. Many samples have been found in which the gold is plainly visible to the naked eye.

Is situated at the head of Gainer Creek, at the foot of the lime dyke, *Badshot Group* which cuts through the country for over 40 miles, and comprises the *Badshot*, *Perry Lade*, *Lone Pine*, *No. 25*, and *Butte*. The development work has been done altogether on the *Badshot*, and consists of an incline shaft to a depth of 80 feet. A cross-cut tunnel taps the lead at the bottom of this shaft; a winze is sunk from the bottom of the shaft for 50 feet on the vein, and drifts are here driven to the right and left for a considerable distance on the ore body. The work has shown up a good strong lead of 6 inches of clean ore, with considerable concentrating ore. During the progress of the development work a large quantity of ore has accumulated.

Situated at the head-waters of Haley Creek, and comprises *Abbott*, *Abbott Group*, *King William*, *Union*, *Kamloops*, and *Wales*. On the *Abbott* a cross-cut tunnel is in for a distance of over 300 feet, which will be pushed forward to catch the vein at depth. The surface is stripped for about 60 feet, and the ledge found to be from 12 to 15 feet in width. Two other large and well mineralized veins have been traced for a considerable distance at 400 and 500 feet, respectively, from the main ledge, and running parallel with it. On the *King William*, in a direct line with the *Abbott*, the ledge is found to outcrop in places for a width of twenty feet, carrying galena and carbonates. The ledge is found to outcrop in several places throughout other claims in this group; also on the *Lucille K*, *Francis Jewell*, and other claims in the adjoining group.

Comprises the *Lardeau*, *Duncan*, *Ella*, full claims, and the *Auld Jim Wagner Group*, and *McCartney*, fractions. Crown grants being applied for. On the *Duncan*, a drift of 100 feet follows the foot-wall. At a distance of 60 feet from the tunnel entrance a cross-cut was run through the ledge 25 feet to the hanging-wall, and 12 inches of solid galena ore, and 30 inches of concentrating was passed through. A winze is sunk for 50 feet on a continuous body of solid ore, averaging 14 inches, and at the bottom of the winze, drifts are extended to right and left for a considerable distance on the ore.

Comprising the *Lucille K*, *Francis Jewell*, *Princess Marie*, and *Queen Mary*, and several fractions, all of which are applying for Crown grants, are a continuation of the *Abbott* vein. A cross-cut is run on the *Francis Jewell*, and cuts the ledge at a depth of 40 feet, and on the *Princess Marie*, *Queen Mary*, and *Lucille K.*, several open cuts have cross-cut the ledge on the surface.

Consists of several claims, viz.:—*Bannockburn*, *Buckeye*, *Silver Bottom*, *Silver Reef*, *Fossil*, *Evergreen*, and *Iron Mask*, is situated at the head-waters of Hall Creek, a tributary of Duncan River. Development work consists principally of stripping the lead of a light covering of wash at intervals, for the purpose of testing the ore. The *Bannockburn* has been stripped for 700 feet, and the pay ore found. The *Buckeye* has been stripped in the same manner for 200 feet. On the *Fossil* a short cross-cut exposes the vein for 20 feet, and carries a considerable body of ore which gives good values, particularly in copper.

Lead of twelve contiguous locations, is situated on Gainer Creek. **Molly Mack** This lead is a very strong one, and can be traced for a distance of over two miles. The work which is done is principally on the surface, and little more is known than the indications there found, which show a large lead of low grade cube galena ore, remarkable for its size and continuity and the very heavy lead values which it carries.

Of three claims, is situated about four miles from South Fork of **Pathfinder Group** Lardeau Creek, on Gainer Creek. A cross-cut is in 200 feet, which, it is presumed, will tap the lead at 300 feet. The surface showing indicates a very strong lead, and is generally supposed to be a continuation of the *Wagner* lead.

About three miles from the mouth of Gainer Creek, has a cross-cut **Silver Chief**, tapping the lead at a depth of 80 feet, where the vein is found to be upwards of six feet wide, with about six inches of galena ore.

Of three claims (Crown-granted), is situated at the foot of the lime **Black Prince** dyke, near the head of Gainer Creek. The vein occurs in a contact of lime **Group** and slate, and is found to be 18 inches wide.

Consists of five full claims, and is situated on the head-waters of **Empire Group** Cariboo Creek, a tributary of the Duncan River. The vein, which is a contact of lime and schist, will average fully 4 feet, and on the *Allouez* claim shows a width of 7 feet. As the vein is free of vegetation and wash, you can walk upon it for almost its entire length. The names of the claims forming this group are: *Revelstoke*, *Allouez*, *Negaunee*, *Pewabic*, and *Crested Butte*. This group adjoins the *Wagner* on the north-west, and is reached from Ten-Mile terminus of the Government waggon road by 4 miles of good pack trail. Some 75 feet of development work has been done, showing up good bodies of ore.

#### SOUTH FORK OF LARDEAU CREEK.

Are situated near the head of the South Fork of Lardeau Creek. A **Silver Belt and** drift on the *Silver Belt* follows the ledge for 43 feet. The vein is about 4 **Agnes Claims**, feet wide, with walls of lime and slate, and has several stringers of ore from one to three inches thick.

Near the head of the South Fork, has a splendid showing on the **Ottawa Mineral** surface, but lacks development. A small vein of carbonates runs along the **Claim**, wall, giving high assays in silver and copper.

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**Davie Group** Comprises the *Cheyenne*, *Coon*, *Davie*, *Jubilee*, and *Crescent*, full claims, and the *Glencoe* and *Daisy*, fractions. The *Cheyenne* is situated half a mile from 8-Mile Camp, on the South Fork of Lardeau Creek ; three distinct veins pass through it. The south vein is 8 feet wide, and opened on its full width for 30 feet, and shows 6 inches of galena ore on the hanging-wall, and several small stringers of ore passing through the vein. On the centre vein a drift is in a short distance, showing a little galena mixed with the quartz. The *Coon* adjoins the *Cheyenne* on the south-east, and has two veins which have been traced for several hundred feet. On the main vein a cross-cut taps the vein at a depth of 20 feet where the lead is 5 feet wide and carries about 3 inches of solid galena ore on the hanging-wall. On the south vein an open cut of 20 feet exposes a large body of quartz, in which specks and small seams of galena are found. The *Davie* adjoins the *Coon* on the south-east. The work on the main vein consists of an open cut and tunnel 35 feet long ; the ore is found on the hanging-wall in small quantities.

**Black Eagle and Sunset,** On Seven-mile Creek, a tributary of the South Fork of Lardeau, have a cross-cut and drift 84 feet. Some very good ore is found in a pay-streak of 6 inches on the wall.

**Union Jack Group** Is situated near Seven-mile Creek, and comprises seven claims. A cross-cut is run 65 feet on the *Jumbo*, one of this group, and will be carried forward for 20 feet farther, where the lead should be met with at a depth of 70 feet.

**Pool Group** Is situated one mile south-east of the Town of Ferguson, and comprises 6 full claims. On the *Nettie L.* a cross-cut is now in some 87 feet, and a shaft has also been sunk on the lead 25 feet.

The *Ajax*, on the same group, has been stripped on the surface, and several cross-cuts put through the ledge on the surface, resulting in showing up a lead which carries a considerable quantity of iron pyrites, giving some good assay values in gold.

## SLOCAN AND SLOCAN CITY MINING DIVISIONS.

## REPORT OF ALEXANDER SPROAT, GOLD COMMISSIONER.

## SLOCAN DIVISION.

Name of Mine.	Number of men employed.	Tons of ore reported as shipped in 1898.	Ore, Development, &c.
Payne .....	130	14,000	Galena and carbonate ore.
Slocan Star .....	110	2,862	Good ore at 900 ft. depth; has a mill and tramway; has done 2,500 feet tunnelling, 1,500 feet upraises and winzes. Ore, galena and concentrates.
Ruth .....	45	3,250	Ore, galena and carbonates. Has done 3,200 ft. of tunnelling, 2,000 ft. upraises and winzes. It is contemplated to put in mill and tramway.
Noble 5 Group ..	35	.....	Is supplied with a fine mill and tramway, and is doing steady development work preparatory to shipping.
Last Chance .....	45	1,700	Ore, galena and carbonates. Is developing large ore bodies; an aerial tramway is about completed.
Sovereign .....	10	160	1,000 ft. of tunnelling.
Ajax .....	14	.....	Galena and zinc ore. 1,500 ft. of tunnelling.
Reco .....	28	480	Rich galena and carbonates. 1,500 ft. of tunnelling and 500 ft. of raises etc. A tramway and mill site have been surveyed.
R. E. Lee .....	8	.....	Has run 740 feet of tunnel, which is expected to cut the lead soon, gaining a depth of 1,600 ft.
Goodenough .....	6	.....	600 ft. of tunnelling.
Blue Bird .....	8	60	Ore, galena. 600 ft. of tunnelling.
Trade Dollar .....	6	.....	Ore, galena. 100 ft. of tunnelling.
Queen Bess Co. ....	65	1,700	Ore, galena and carbonates. Has done 5,000 ft. of tunnelling, raises, etc.; also built extensive buildings during the year.
Idaho Mines .....	45	4,000	Ore, galena. Paying dividends.
Ivanhoe .....	.....	.....	Has been doing development work for 18 months; has large amount milling ore blocked out; contemplates erection of a mill in spring—difficulty of approach has been obstacle.
Treasury Vault ..	25	20	Ore, galena and carbonates.
Miller Creek Co. ..	6	40	Ore, galena and zinc.
Dardanelles .....	14	75	Ore, galena; has 2 ft. of ore at a depth of 500 ft.
Rambler .....	25	580	Ore, galena.
Antoine .....	30	350	Ore, clean galena.
Washington } Slocan Boy } .....	12	.....	Just commenced work under new management.
Great Western ..	6	.....	Ore, concentrating. 300 ft. of tunnelling.
Madison Group ..	4	20	A "dry ore," some of very high grade. 175 ft. of tunnelling.
Minnehaha .....	7	.....	300 ft. of tunnelling.
Red Fox .....	.....	.....	Closed for winter, owing to difficulty of working.
Wakefield .....	45	.....	Ore, galena and carbonates. 2,000 ft. of tunnelling done this year; developing all summer, preparatory to shipping over rawhide trail to waggon road.
Comstock .....	60	.....	600 ft. of raises, 700 ft. of tunnelling; developing all summer; now constructing concentrator on Finnell Creek.
Vancouver .....	35	300	Developing all summer a large body of rich galena ore.
Galena Mines .....	12	.....	Developing all summer; has a large body of concentrating ore; well equipped with modern hoisting plant.
Bartlett Group .....	.....	.....	175 ft. of tunnelling. No shipments, owing to difficulty of access.
Condor Group .....	8	.....	300 ft. of tunnelling.
Essex } Edinburgh } .....	5	.....	Engaged in development.
Bosun .....	27	420	Ore, galena. 2 cross-cut tunnels to cut vein, and a 75-ft. shaft sunk in ore. First assessment work on this property was done last May.
California .....	15	40	230 ft. of tunnelling this summer; shut down for winter.
Marion .....	11	.....	



GENERAL VIEW—BONNINGTON FALLS POWER PLANT—KOOTENAY RIVER, W. K.





## SLOCAN CITY DIVISION.

Name of Mine.	Number of men employed.	Tons of ore reported as shipped in 1898.	Ore, Development, &c.
Enterprise .....			Ore, galena, high in zinc. Developing only; 450 ft. of raises and 280 ft. of tunnelling; large amount of ore blocked out.
Evening Star....	13		Developing, with promising results. A steam hoist has been erected.
Golden Wedge ..	30		Developing.
Springer Creek ..			The ore is mostly "dry silicious." 5 carloads have been shipped.
Other Claims....			About 8 other claims on Lemon Creek are being developed, but have not shipped.

## OFFICE STATISTICS—SLOCAN MINING DIVISION.

Number of Locations recorded.....	498
" Certificates of Work issued and recorded .....	807
" " Improvements issued and recorded .....	112
" Free Miner's Certificates issued .....	560
" Water Rights granted .....	10
Cash received in lieu of work done .....	\$1,600

## OFFICE STATISTICS—SLOCAN CITY MINING DIVISION.

Number of Locations recorded.....	356
" Certificates of Work issued and recorded .....	596
" " Improvements issued and recorded .....	7
" Free Miner's Certificates issued .....	340

## SLOCAN CITY DIVISION.

By KINDNESS OF J. C. GUILLIM, B. A. SC., SLOCAN CITY.

No great activity has taken place in this Division during the past year, nor has there been any extensive shipment from the mines which are in a position to ship more heavily.

The only properties worked continuously by strong management have been the *Enterprise*, on Ten-mile Creek, and the *Golden Wedge*, on Lemon Creek. Both of these have confined themselves almost entirely to development and blocking out of ore bodies.

In the past season, 596 records of assessment were made, which goes to show that there are many surface showings worth holding. The whole of this Division lying east of Slocan Lake and River is occupied by mineral claims, with generally a little surface work done, and stripping of the many quartz veins, characteristic of this granite area.

Since the premature booming of this section two years ago, but little capital has been employed in development, and the original prospectors or owners have been working in a limited way, with the result, that as far as it goes the work done encourages confidence in the permanency and values of the ore bodies. At the present time, twenty properties are being

worked, employing about 125 men in all; of these twenty, only five are under strong outside company management. These five employ about 80 men, the rest being scattered in twos and threes, working their own properties on their own limited means and in some cases undertaking cross-cuts and dead work of up to 200 feet in order to reach the ore bodies.

The whole mineralized portion of this Division, so far as known, lies in granite. Two main varieties of veins being worked upon, are:—

1st. The “dry ore” quartz veins, which carry values in gold and silver, associated with iron pyrites and silver sulphides, and also, sometimes, free gold and silver. These are, by far, the most prevalent. Such are *Golden Wedge*, *Chapleau* and *Evening Star*.

2nd. The more or less “wet ores” carrying only silver and lead values, associated with usually considerable zinc blende; such as *Enterprise*, *Arlington* and *Two Friends*.

The development now going on, although somewhat limited, has not substantiated the theory, at one time held, that the characteristic quartz veins are local segregations. With the exception of more or less faulting, according to locality, these veins appear fairly regular and persistent.

A fact of some importance is the wide occurrence of gold-bearing veins throughout this granite area. At times, more or less free milling, and at others, associated with pyrites and silver sulphides; the ratio of gold to silver being of great variation. The occurrence of gold ores on Eight-mile Creek, at the *Joker*, on the South Fork of Kaslo Creek, and the steady occurrence of gold values in all dry ores of Springer and Lemon Creeks, is worth recording, in connection with the attention now being paid to quartz veins in Nelson Division and the introduction of the Golden Wedge Stamp Mill on Lemon Creek.

The following description applies to properties on which development work, other than assessments, has been done during the year, and to properties at present being worked:—

#### SPRINGER CREEK.

*Two Friends*—Shaft down 30 feet on eastern vein and cross-cut run in 100 feet; expected to reach the vein in a few more feet. Two men working.

*Bank of England*—Under lease to local parties. This property is approached through the old workings of the *Two Friends*, and a body of galena and zinc blende recently encountered. Two men at present working.

*Aztec*—Situated immediately south of *Two Friends*; worked continuously since spring, by J. R. Smith. Open cut 85 feet; tunnel, 40 feet, cross-cutting to vein.

*Lilly B.*—Some little work done on cross-cut and in sinking, with ore showing in shaft. Not working at present.

*Arlington*—No active work done since last winter. One man employed to keep shaft pumped out. There is some prospect of renewal of work under change of management. There is an 18-horse-power boiler and hoist at this mine, and a very strong and wide vein shows up for about 300 feet by drifting on the lower level.

*Rainbow*—Sixty feet of drifting on vein in early summer, and shipment made to Hall Mines Smelter.

*Tamarac*—About 80 feet of drifting done during the summer. Now under option. Nature of ore, galena, zinc blende, and silver sulphide.

*Medina*—On Mineral Hill, drift tunnel 40 feet. Owned by eastern people.

*Erin Fraction*—Near the last, under lease to Andrews and O’Neil. Shaft, on ore body 20 feet. Two men working.

*Standard Fraction*—Located near the last mentioned. Two men working, drifting on the vein, have driven 30 feet.

*Republic Group*—A little work off and on being done. Nature of ore-body, quartz, silver sulphide, gold and pyrites; also some ruby and native silver.

*Calumet*—Owners are driving a 160-foot cross-cut to tap a body of galena ore which follows the contact of granite with a mass of dark slate-like rock. Three men working; tunnel run in 120 feet.

*Jubilee*—At the head of 12-Mile Creek. Some shaft and drift work done on vein during last few weeks. Owned by Messrs. Clough and Bradshaw.

*Climax*—Shaft and drifting 40 feet, worked by Messrs. Atchesen and Law.

*Evening Star No. 8*—Situate on Dayton Creek and now under bond and operation of Hugh Sutherland. Active work began in August; a 3-mile trail built from Springer Creek waggon road, and a 15-horse-power boiler and hoist taken up (made by Lidgerwood Machine Co., of New York). This is the second hoist to be installed in this Division. The main shaft has been driven over 100 feet on the vein with satisfactory showing, and it is intended to carry on the sinking a considerable distance further for exploratory purposes. The nature of the ore-body is a quartz vein with silver sulphides and pyrites, with variable gold value. Twelve men are at present working, altogether on development.

*Columbia*—Under the same management, and adjoining the *Evening Star*, a good deal of drifting and exploratory work done during the year, and a small shipment made. Some work now going on with more in view.

Upon the development on these veins, together with that of the *Golden Wedge*—both being upon typical quartz ore bodies—a great deal depends in the matter of inspiring confidence in the district.

#### LEMON CREEK.

*Barnett Group*—150 feet of incline tunnel and drifting on the vein. Crown grant applied for. Ore, quartz, silver sulphides, and pyrites.

*Alexandria*—On summit, between Second and Third North Forks of Lemon. Operations begun in past summer and continued since; shaft, 80 feet; cross-cut now being driven; 2 men working. Crown grant applied for. Ore, chiefly galena.

*St. Lawrence*—Near *Alexandria*. Owned by Eric Lemieux. Cross-cut being driven, now in 66 feet.

*Lone Dutchman*—Under option to purchase. Said to be large bodies of pyritic ore.

*Alpine*—Not under active operation, having passed out of hands of the company formerly working under bond. More or less free-milling quartz ore body, with several thousand dollars' worth of work done. On the divide, east of Kootenay Pass.

*Monument Group*—On the divide, west of Kootenay Pass, partly in Nelson and partly in Slocan City Division. Now under bond to Hall Mines, Limited. Development carried on during the fall up to November 1st; discontinued on account of situation during the winter. The ore is a mixture of quartz, pyrrhotite, and copper pyrites.

*St. Lawrence*—Near *Monument Group*. A cross-cut, 70 feet, has tapped a strong vein of mixed quartz, galena, and zinc blende. Operated during the fall by W. E. Boie *et al.*

*Golden Wedge*—This mine is situate some 2,000 feet above the new town of Oro, at the junction of Second North Fork with Lemon Creek. It is reached by pack trail from Slocan City, but during the year 5 miles of waggon road and 12½ miles of sleigh road have been built to connect it with Kootenay Lake and Nelson.

The mine has been worked continuously during the year by the British-Canadian Gold Fields, Limited. An upper cross-cut 50 feet, and drifting on the vein 300 feet. A lower cross-cut, 175 feet long, taps the vein at about 200 feet lower down; 100 feet of drifting on the vein at this point. The ore body is a free milling quartz in the common granite country rock.

A sleigh road of 2 miles connects the mine with the townsite of Oro, where considerable progress has been made, consisting of a saw-mill of 10,000 feet per diem capacity, flume 2,000 feet long, mine offices, assay office, and construction of a 10-stamp mill expected to be in commission during February. This mill will be run by Pelton wheel, under head of 150 feet, and is made by Jenckes Machine Company, of Sherbrooke, Que. It is the first to be built in the Slocan, and is in a position to do custom work for the many, more or less free milling quartz, ore bodies in the vicinity, should such be desirable. Connected with the mine and mills some 50 men are employed.

*White Sparrow*—On the First North Fork of Lemon Creek. A cross-cut tunnel, now in 130 feet, is being driven by the owners; it is expected to reach a large deposit of pyrrhotite. Two men have been working since July.

*Kilo and Saddle Rock*—A small trial shipment of gold ore taken out and shipped during the Fall. Not working now.

*Howard Fraction*—Developed considerably in the past, but not during the year. Crown grants for this group applied for.

*Tail-holt*—Continuously worked during the past six months drifting and sinking on the vein. Owned by W. Ferguson.

*Hoodo*—Under lease during the fall to Tutor & Rackliffe; discontinued when snow fell.

*Chapleau*—On First North Fork of Lemon. Worked by owners up to August 1st, and one car lot of gold and silver ore shipped. Drift tunnel run 90 feet. Ore body, quartz vein carrying gold and silver values in pyrites of iron. Now under lease. Drifting and sinking on the vein to be carried on.

*Creole*—On Lemon Creek. Drift tunnel being driven in 40 feet. P. W. George *et al.*, owners.

*Hope*—50 feet of tunnel work done on a rather extensive deposit of zinc blende, hematite, and galena, carrying silver values. Crown grant applied for.

*Big 4*—South of Lemon Creek. Cross-cut driven 80 feet during summer.

#### TEN-MILE CREEK.

*Joker Group*—At the head of 10-Mile Creek and South Fork of Kaslo Creek. Under operation of Klondike Champs d'Or Company, Ernest Mansfield, Manager. Ore body, quartz vein carrying good values in gold. Contract let to sink shaft 100 feet, 40 feet already driven.

*Crescent Group*—Adjoining claims owned by Messrs. Boie and Rackcliffe, under option to the same people for \$30,000.

*Ohio Group*—Extensions of *Enterprise*, and adjoining it to the south. Cabins built and work being carried on all winter by the owners, Kirkwood and Wells. Drift and tunnel work.

*Enterprise*—The following information was kindly furnished by Mr. W. F. Dubois, of this mine.

The group consists of two claims and a fraction. Development work now going on with 17 men employed; consists of driving ahead on the vein and making connections between leads.

There are seven tunnels in a vertical distance of 785 feet, three of these tunnels being in over 700 feet. Raises have been driven for air and safety, and all show ore. The development proves a continuous ore chute some 3,000 feet long. When stoping ore about 60 men are employed. One thousand tons of ore were taken out in  $3\frac{1}{2}$  months, 400 tons of which have been shipped to smelter, and 600 tons lie at company's wharf on Slocan Lake. During development an additional 400 tons have been taken out. This coming from the tunnels and raises more than clears expenses of development. The latest work done was to drive an intermediate tunnel, 267 feet, to intercept a raise from No. 3 tunnel. When this is timbered the mine will be in excellent shape to take out ore, and one of the best ventilated mines in British Columbia.

Work has also been done on the *Oregon City*, with some ore shown up, as well as on the *Edmonton Group*.

The annual assessments all along Ten-Mile Creek have been well kept up.

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## AINSWORTH DIVISION.

### REPORT OF JOHN KEEN, MINING RECORDER.

I beg to hand you my report for the current year on the Ainsworth Mining Division, the headquarters of which are in the City of Kaslo, on the west side of Kootenay Lake, about the centre of the Division.

This Division adjoins that of Goat River on the south, and extends in a northerly direction on either side of Kootenay Lake for a length of about 100 miles, having a width of 25 miles and a superficial area of 2,500 square miles.

The major part of the territory is mountainous and heavily mineralized, but there are very many small tracts, varying from 10 to 200 acres, which are suitable for raising good nutritious wild hay, potatoes, cabbage, and general market garden vegetables, for which there is a great demand for camp use, and the supply of which is at present obtained from the United States. With the exception of a few white men operating in the Duncan River Valley and meadows, this industry has been carried on by Chinamen, but the remuneration the white men are realizing from their industry in the Duncan River Valley may, in time, induce others to follow their example, for a quantity of small tracts are still open either for pre-emption from the Government or purchase, at nominal prices, from the Railway Companies, who hold the lands by reserve. It is a matter of great regret that the vegetables required for the camps should be supplied from the State of Washington, when they could be entirely supplied from the district itself, and be in fresher and better condition. Inexperienced prospectors would realize greater profits from their cultivation than from aimless wanderings over the hills, not knowing valuable mineral when they pass over it, as the experience of the past eight years has so often proved.

### BLUE RIDGE CAMP.

This group is composed of the following claims :—*Homestake, Yosemite, Eureka Group, Scottish Chief, Parrot, Eureka, and Echo*. The *Eureka, Homestake and Yosemite* have had the following work done during the year:—790 feet tunnels, 370 feet sinking and upraising, winzes and drifts 220 feet. Ore, argentiferous galena of high grade, of which 130 tons have been taken out. These properties are at present shut down for the winter. One of the owners having been killed in a snowslide, they will in

future only work during the summer season. This group has given employment to eight men during the past season.

This claim has a tunnel 60 feet long, and considerable prospecting has been done. No ore has been shipped as yet, but about 10 tons are now on the dump awaiting rawhiding. The intention is to work continuously in future and to fully develop the mine. Ore, argentiferous galena of good grade. Six men employed.

There are a large number of other claims or prospects located on this hill, but so far nothing but the annual assessment work has been performed, though the majority have good surface showings. The owners are prospectors and have not sufficient funds to develop them.

#### HOT SPRINGS CAMP.

This is the oldest camp but one in the West Kootenay District. The bulk of the claims are very old locations, dating back as far as 1883, and have been worked with more or less success since its inception, but the camp is now passing through a transition period from the slow, old-fashioned method of hand-drilling, manual windlass work, and mule packing, to compressed air drills, concentrators, steam hoists and elevated rope tramways.

There are in the camp two concentrators, one worked by steam and the other by water power. Two tramways lead to the former, which is owned by the firm of Maxwell Stevenson & Son. The latter, owned by the Canadian Pacific Mining and Milling Company, is not at present working, owing to certain difficulties in the company.

On Woodbury Creek the *Albion* mineral claim, the *Pontiac* group, and the *Grant* group, together with a number of other single claims are working with a complement of some 60 men in all. These properties are just commencing to rawhide their ore to the Kootenay Lake for shipment to the United States.

The *Little Donald* and *Black Diamond*, lying off the waggon road, are working through a joint tunnel. Other development work, consists of tunnels aggregating about 800 feet in length with cross-cuts, winzes and drifts.

Messrs. Stevenson & Son, the owners of the steam concentrator, have taken over these claims and are constructing a flume to drive the air compressor, with which they intend to work the property.

The ore is of medium grade and is said to average 40 % lead and 90 oza. silver. Fifteen men are at present employed, which complement will soon be increased to 60.

This claim is looking well. All the lower workings have proved the claim to be a mine with depth, and the concentrates (4 to 1) have assayed from 300 to 600 dollars per ton. Some clear argentiferous galena has been shipped direct without concentration, but the main ore body will have to pass through the concentrator. Thirty-seven men are employed on the works.

This claim is of the same character as the *Number One*. A contract has been let for the extension of the existing shaft (at present 250 feet deep) to an additional depth of 200 feet, and this is now in course of execution. The shaft is in good ore, which is principally a "dry ore." Eighteen men are employed.

This claim is being taken up with spirit. A new cabin has been erected and the tunnels are in nearly 1,800 feet, which gives a depth of nearly 500 feet. A large flume is in course of construction to supply power to an air compressor, and an hundred-ton concentrator will be completed by July, 1899. A

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good waggon road has also been completed from the town to the mine. Twenty-six men are employed, and the intention is to work continuously from now on.

**Rand.** This claim is now working again, contracts having been let for 100 feet of tunnel, to open up a large ore shute showing about 75 feet long on the surface. It is a large, strong vein, and cuts the formation about north-east and south-west. Shipments will commence as soon as this is reached. Twelve men are now employed.

**Twin.** Work has been resumed on this claim. The extension of the present tunnel (No. 5), which is now in 220 feet, is contracted for, and the ore body, which shows up well in the No. 4 tunnel, is expected to be struck in about 70 feet. Development will continue till sufficient ore is blocked out to commence shipments. Nine men are employed. Ore, argentiferous galena.

**Tamarac.** This claim is under bond to an American firm and is being operated by their agent, V. A. Johnson, of Minnesota. A tunnel is being driven to catch the vein at a depth of 150 feet. This tunnel is going to be used jointly with the adjoining claim, the *Surprise*. Twelve men are employed. The manager expects to ship ore early in January.

**Silver Glance.** Work is being continued on this claim and a shaft is being sunk at the side of the ore body. About 180 tons of clean ore are ready for shipment. Six men are employed. Shipments have just commenced.

The foregoing are the principal claims, in this camp, which are being worked and are either shipping or are about to ship ore. One pronounced feature of the camp is the energy with which the inhabitants are now working, the number of enquiries which are being made for "developed" claims, and the readiness with which bonders and bondees reach a business contract. Provisions are being taken up in large quantities to all the mines, and the camp is now assuming a business attitude such as has not been seen for some years past. It has, to a great extent, recovered from the effects of the disastrous fire of 1896, when two-thirds of the town was destroyed, and at the present time there is not an idle man in the camp.

#### BLUE BELL CAMP.

**Blue Bell.** This was the first mining camp in the West Kootenay District, the *Blue Bell* claim having been located in January, in 1883, by R. E. Sproul, but was known to the Hudson Bay Company long prior thereto. Since that date several other claims have been recorded surrounding the original claim and were all acquired by Dr. Wilbur A. Hendryx, and by him transferred to the Kootenay Mining and Smelting Company.

For the treatment of the ores this company erected a concentrator and smelter at Pilot Bay, where the ores were, for a time, smelted and the matte sent to the United States, but owing to the cost of fuel and the low grade of the ores, and the then difficulty of obtaining fluxes, the business was not successful and the concern was closed down pending the completion of the Crow's Nest Pass Railway, when cheap and plentiful fuel would enable them to work at a profit. Dry ores, lime rock, and iron ore are now to be had through the Duncan River Camp, Whitewater Basin, and on the east and west side of Kootenay Lake within easy reach of the waterway, having been staked either under the "Mineral Act," or "Land Act," as iron mines or lime quarries respectively. The ore at the camp is high in lead but very low in silver. No work is now being done and the property is simply in charge of a watchman.



Nearly all the claims have been Crown-granted, and the remainder are represented annually by assessment work, but are still in the hands of the prospector, who, in this as in other camps, is too short of funds to open and develop his property.

#### WHITewater CAMP.

This claim was located in 1891 by J. C. Eaton, and has been worked almost continuously since 1894. It has proved to be the best paying mine in the Division, and is now the property of an English company. This year the new owners have applied their energies in blocking out the ore for stoping ground. They employ about 120 men, and have erected the best equipped concentrator in the Division, with a capacity of 120 tons per day. Thirty-four cars of ore were shipped from ore encountered in development work only. The ore is argentiferous galena of high grade. The men's quarters and the whole equipment of the mine are first-class. The management is systematic, close, economical, and business like, and the mine itself is fairly honeycombed with tunnels, winzes, cross-cuts, and drifts.

This group has had a great deal of prospecting done this year, and the Charleston Group. efforts have been directed chiefly towards tracing the ore and developing the claim. No ore has been shipped this year. Eighteen men are employed. The property is owned by a Montreal company.

*Whitewater Deep, Whitewater Deep Fraction, Nancy Hanks, and Wedge Fraction.*—These claims, as well as the major part of the townsite of Whitewater, have been purchased by the Whitewater Deep Company. They have erected commodious lodging and boarding houses for the staff, with assay and general offices.

The claims have been developed and opened out during the summer by a force of 80 men. A flume from Lyle Creek, 5,000 feet long, supplies power to the air compressor, which will supply compressed air to the drills in future. Operations have just commenced on the lowest level to drive a new tunnel, 1,800 feet long, to tap, at a depth of about 1,000 feet, the ledges of the above claims which have been exposed in the upper tunnels. A waggon road has also been constructed, about 600 feet long, to meet the Whitewater waggon road.

Bunk houses and boarding houses have been erected for the men at the mines, also extensive ore houses. An electric plant is about to be installed to light the mines and town.

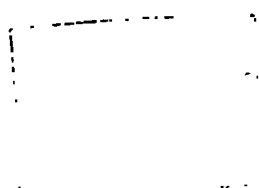
The ore here is believed to be a continuation of the celebrated Whitewater vein, and a sample carload shipped has, I am informed, confirmed this theory, the values realised being the same as from the Whitewater ores, and highly satisfactory to the management. The property is under the superintendence of good business men, who are carrying on the work with tact and energy, and no justifiable expense is being spared to convert the claims into well-developed mines.

There are a very large number of claims in Whitewater Basin, about 3 miles from Whitewater Station on the Kaslo and Slocan Railway, but all, or nearly all, are owned by the prospecting class, who cannot afford to develop; but it is satisfactory to know that nearly all of them have been represented by the annual assessment work and duly recorded.

A few fine specimens (float) of native copper, and also gold rock (white quartz), have been brought in, but the ledges, so far, have not been discovered.



BONNINGTON FALLS POWER PLANT—SHOWING TAIL-RACE.



## JACKSON BASIN CAMP.

This group (Crown-granted) is composed of the following mineral claims:  
**Jackson Mines.** *Northern Belle, Ophir, Dublin Queen, and Kootenay Star.* These were located in 1892 by Robert Jackson, who has disposed of his property to an English company. The new owners have devoted their attention to development work mainly, and have erected a fine concentrator of 40 tons capacity, which is now running successfully. It is equipped with both steam and water power, the former power to use in the dry seasons, when water may be scarce in Jackson Creek. Three cars of concentrates have been shipped, the returns from which, I understand, were highly satisfactory. The ore is high grade argenteriferous galena. Forty-one men are employed at the mine, which is well found and under the direction of an able superintendent.

These claims (Crown-granted) have been purchased by an English  
**Alameda and Sir Charles.** company. During the year a great deal of development work has been done, which has exposed a good chute of concentrating ore. Fifteen men were employed during the season, and now the claims are closed up for the winter. The ore is fine steel galena of high grade.

The *Crown Point*, a very fine prospect, was sold and has been Crown-granted. Work will commence in good earnest when the machinery is in place in the spring. The *Echo*, *Lucky Edd*, and *Franklin* mineral claims have had a little work done, but no systematic development on anything like a large scale has been attempted.

This is a most popular camp, containing a very large number of claims, principally in the hands of the original locators, who have hitherto held them at prohibitive prices.

Every claim in the basin has been represented this year, which fact, in itself, is a very satisfactory feature.

## KASLO CAMP.

This claim is under bond to the Hall Mines, Limited. Considerable  
**True Blue.** development work has been executed during the past six month in tunnels, winzes and cross-cuts. The ore is high grade copper, carrying some gold. Fifteen men are employed. A tramway, about two miles in length, will be constructed to Kootenay Lake in the spring. A flume will also be constructed to supply power for an air compressor, after which the work will be carried on by air drills.

A number of other claims have been located around this one, and as soon as the snow has gone development work will be pushed on all of them, as enquiries are now being made in this locality for developed claims.

Situated on east side of Kootenay Lake, about one and a half miles  
**Leviathan Group.** north of Kaslo. The group, which is owned by a Kaslo company, comprises 8 claims, viz:—*Mayflower, Tecumsee, Tiger, Vanderbilt, Sunflower, Nancy Hanks, Consolidated, and Mollie Marsh.* The ore is copper, very similar to the ore in Rossland camp, and carries gold. Tunnels and cross-cuts have been put through the claims. Twenty men are employed, but no ore has, so far, been shipped.

*Kootenay Ore Company and Sampling Works*, Kaslo Bay, Kaslo City. These works, operated by steam power, have a capacity of one hundred tons per day, and are kept busy. Ores are sampled, sacked, and dispatched to any smelter the owners may desire, or are purchased for spot cash at the option of the mine owners.

#### MIDGE CREEK CAMP.

This camp is situated at the head of Midge Creek, on the west side of Kootenay Lake, nearly opposite the town of Sanca. The ore is copper, carrying a little gold. These two claims are ready to receive certificates of improvement prior to the issuance of Crown grants. Considerable work has been done on the claims since their location by the Hennessey Brothers in July, 1894. Preparations are now being made for extensive development as soon as the machinery is on the ground. Ten men are employed.

A number of other claims surround these original locations, but no work other than the annual assessment has been performed thereon. Efforts will be made to get a waggon road from the Kootenay Lake to the claims in the early spring. If money can be raised for the purpose, the waggon road will be extended from the Lake over the divide to Ymir Town, on the Fort Sheppard and Nelson Railway, and, if the ore in sight next spring should warrant it, a tramway will be constructed for the purpose of accommodating all the claims jointly.

#### DUNCAN RIVER CAMP.

*President, Two Brothers, Hauser, Hauser Fraction, and President Fraction.* This camp is situate about one mile above Hauser Lake. The claims were located in June, 1893, by the Gallop Brothers, and have been worked more or less since that date. A tunnel is in some 750 feet. The ore is a medium grade galena. These claims have received certificates of improvement for the purpose of obtaining Crown grants, for which application has been made.

A Montreal syndicate has this year been operating on the Upper Duncan River, employing quite a number of prospectors, and a large number of claims were located and recorded, the most valuable of which are the following, on which assessment work has been recorded for the current year:—*Jubilee, Taffy, Big Annie, Svengali, Trilby No. 1, Trilby No. 2, Gecko, Midnight, Laird, Grey Eagle, Chicora, Canada, Teddy S., Jessie, Muriel, Ptarmigan, Whistler, Snow Bird, Merry England.*

The ores vary considerably, there being argentiferous galena, "dry silver ores," copper and gold rock, but in no case has sufficient work been done to form any definite opinion as to values, though the ore bodies are stated to be very large and well defined on the surface.

Some two hundred other claims have been located in this camp this year, and assessment work has been recorded on a large number of previous years' locations. Should the contemplated railway be constructed up this non-navigable river next year the camp will go forward by leaps and bounds, and bonds on claims in that locality will be eagerly sought for.

#### WHITE GROUSE MOUNTAIN CAMP.

This group comprises the following mineral claims, viz:—*Gold Bank, Harris Group, Yukon, Copper Star, Maple Leaf, Roseene, Bostock, Haltonian, Alaska, and Harris.* They are located in a granite formation, situated at the top of the mountain, and are reached from the Town of Sanca, from which a fair foot-trail runs to the claims. A company has been formed to take them up, but up to the present time, though they are three-year-old locations, nothing but the annual assessment work has been done. The ore carries gold, silver and copper, the ledges being large, and covered with a heavy iron capping.

A large number of other single claims have been located by different prospectors, and are still held by them. The ore is of similar character to that of the *Harris* group, but up to the present time nothing but the annual assessment work has been done; very few of them, however, have been allowed to lapse.

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CRAWFORD CREEK CAMP.

*Crescent, Cyclops, Black Prince, Grand View, and Sunrise.* These claims are owned by the Maple Leaf Mining and Development Company, and are situated on Hooker Creek. Sixteen men have been employed all the summer in development work, the result of which has proved satisfactory to the company. The ore on the various claims is of a mixed character, containing copper, gold, lead, and silver. The claims will only be worked by a few men this winter, the intention being to open up the whole group in the spring.

The claims are situated at the head of Hooker and Redding Creeks, about 4,500 feet above the Kootenay Lake, and are very difficult to reach in winter time. Some 26 other claims are located in this vicinity, all of which have been this year represented by the annual assessment work. The whole country rock in which these claims are located is granite.

## SOUTH FORK CAMP.

These are the two oldest claims in this camp; they are now Crown-Montezuma and granted, and are owned by a Seattle Company. A 150-ton concentrator Mexico. has been erected, which is supplied with water power from a flume about two miles long, on the north side of the South Fork of Kaslo River. These claims were located in September, 1891, by Ed. Becker, T. McLeod, Chas. Rossiter, and John Sandon. Twenty-four men are employed in development work. The ore is fine steel galena.

In previous years a quantity of ore was shipped, but this year nothing but development work has been carried on, though the ore encountered in this work was shipped out of the way.

An air compressor is being completed and the work will, in future, be carried on by air power. First class buildings for the accommodation of the miners have been constructed, and the whole is lit by electricity.

Further up the creek are the following claims:—*Briggs* Group of nineteen claims, which have recently been acquired by an American Company, and will be worked continuously from now on with a force of 10 men, to be increased as soon as the snow has left the ground and surface prospecting made possible. No ore is being shipped at present. *Black Fox, Bismark, Gold Cure, Silver Bell, Little Bell, Gibson, Palouse*, and a large number of other claims have been located there during the past year, but those mentioned above are old locations from which ore to some amount has been shipped. Some 200 men have been engaged on the various claims during the year, and it is a satisfactory feature of the camp that all claims have been worked and assessment work recorded. Bonds are now in course of preparation in various attorneys' offices for the aforementioned claims. The general character of the ore is high grade galena, lying between a slate and a granite formation. One shipment of two carloads has been made from the *Silver Bell*.

A good trail extends from the "Forks" to the *Briggs* group, and it is hoped this will be extended six miles farther in the early spring.

## GENERAL REMARKS.

In conclusion, I may say that all the camps mentioned are well supplied with wood and water, but they need more trails and waggon roads. All of these camps have now passed out of the hands of the speculative prospector, who has practically left for new fields, leaving it in the hands of prospectors who are staying with their claims, and who are trying to develop their properties in a small way and prepare them for bond or sale.

As men of means are coming into the country, companies are being formed for the acquisition of such claims. They prepare for extensive exploration work prior to taking up any bonds they may enter into. If such work proves the statements of the prospector and the general surface showing, the deal is completed and the transfer of the property takes place. A small cash payment, as an earnest to do so much work in a given time, is the best arrangement for both prospector and intending purchaser. This prospectors are beginning to realize, and the general prosperity of the various camps will surely follow. In any case, the prospector reaps an advantage, because he then knows the facts, and he either has a mine to sell or he knows that he need not waste further time on his claim.

The past year, generally, has been devoted more to development work than to the shipment of ores. Some of the larger mines have shipped nothing but what was met with in development, notably *Whitewater* mine, which has been the largest shipper in this Division hitherto.

#### OFFICE STATISTICS—AINSWORTH DIVISION.

No. of Mineral Claims, locations, recorded .....	939
Certificates of work issued and recorded .....	1,346
Payments of \$100 in lieu of assessment work .....	13
Bills of Sale, Bonds, etc., recorded ... ..	377
Free Miner's Certificates issued .....	1,053
Mining Receipts issued .....	2,032
No. of notices sent out on mineral tax, assessed taxes, and Crown-granted claims .....	2,260
No. of letters written during the year .....	2,035
Certificates of Improvements recorded .....	54

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#### NELSON MINING DIVISION.

##### THE HALL MINES SMELTER.

The Hall Mines Smelter is situated on the hill just back of the City of Nelson, and, while originally built for the treatment of ores from mines belonging to the same company, has gradually taken up "custom smelting" and is prepared to buy both copper and lead ores, carrying gold and silver values.

The Superintendent of the smelter, Mr. R. R. Hedley, writes me that they "are bidding specially for ores carrying well in copper."

The price paid per pound for fine copper contained, has been about 6 to 6½ cents less than New York market price; for silver, 95 % of such market price, and \$19.25 per oz. for gold, from which total is deducted a smelting charge of from \$7 to \$8 per ton of ore.

The smelter treated some 800 tons of lead ore last spring, and is being fitting up more especially for such ores in future.

The price paid for silver-lead ores has varied with the character of the ore, the treatment charge being from \$10 to \$16 per ton, with a price of \$19.25 per ounce for gold, 95 % of New York price for silver, and for lead 90 % of such price, less duty, 1½ cents per pound.

Under the conditions existing last Fall, the smelter could not compete with American smelters on ores carrying over 40 % lead "for the reason, that above that percentage, the additional duty on pig-lead offsets any advantage we may gain in freights."

I am indebted to Robt. R. Hedley, Superintendent, for the following description of his smelting practice:—

“These works were established originally to treat *Silver King* ore. This ore, in the past few years, has varied but little in composition. Generally speaking, this may be figured as 37 % silica, 8 % lime, 6 % magnesia, 10 % ferrous-oxide, 10 % manganous-oxide, 3 % copper, and 3.3 % sulphur. This may be taken as an average of the output of the *Silver King* mine for the year, though it has varied all the way between 2 % and 5 % copper; and latterly the sulphur has slightly increased in proportion to the copper. Starting with such an ore, which might be considered self-fluxing, it is obvious that no preliminary roasting is required; we have to do with the straight ore. We have found it economical to use about 10 % limestone as flux, though we have demonstrated that it is possible to reduce this considerably. Originally, with the inception of smelting at Nelson, a furnace was built, with dimensions at the tuyeres of 40 inches by 100 inches, giving a capacity of, roughly, 150 tons of charge per day. During the summer of '97 a larger furnace was built, with dimensions of 44 inches by 144 inches at the tuyeres, giving a normal capacity of 280 to 300 tons of charge. The practice has been, when dealing with *Silver King* ore solely, to smelt the ore as it comes from the mine, concentrating from 16 to 30 parts into one, with a consumption of about 15 % coke, of quality such as supplied by the Coast collieries. This first smelting, until recently, has produced a matte carrying on an average about 50 % copper. Latterly, however, a matte produced from *Silver King* ore solely, will carry but 44 % copper, owing to the increased proportionate sulphur contents. During the past spring and summer, we have departed from our rule of producing a high grade first matte, owing to the handling of a considerable quantity of custom ores, notably *War Eagle*. *War Eagle* ore in its raw state has frequently formed 20 % of the charge, and the grade of matte under such conditions falls to about 25 % copper. This matte has been roasted, and after grouting with quick-lime, re-charged to produce a matte of 50 % copper, which is the minimum desirable for reverberatory work. The charge as stated, *Silver King* ore and limestone, or *Silver King* ore, *War Eagle* ore and limestone, with, occasionally, a small proportion of other custom ores, produces a slag, the composition of which, while it varies slightly in its silica, iron and lime contents, invariably carries extremely low values, varying from 0.26 to 0.4 % copper and from 1 to 2 ounces of silver, according to the grade of matte produced.

“With the installation of a reverberatory plant, consisting of two hand-work calciners, with a hearth 14 by 44 feet and two reverberatories, the shipment of matte ceased, and the practice has been to calcine about one-half of the matte produced, and charge to the first reverberatory about 8,000 pounds of calcined and 8,000 pounds of raw matte, and 1,200 to 1,500 pounds of quartz or silicious material. This, in 12 hours, will tap a good bed of white metal (about 75 % copper) and form a slag, varying between 1 and 1½ % copper, which returns to the blast furnace. This white metal is then crushed and a portion of it calcined, the second reverberatory taking a charge of about 32,000 pounds calcined and 8,000 pounds of raw white metal, with 600 to 800 pounds of silicious material. With the furnace in good condition and all things favourable, this will produce in the neighbourhood of 15 tons of copper in anode form in 24 hours. This anode copper averages between 97 and 98 % copper, and carries values from 300 to 800 oz. of silver and from 5 to 30 oz. of gold to the ton, according to the ore treated. The slag from this second reverberatory, carrying from 12 to 16 % copper and its quota of silver and gold, is charged either to the first reverberatory or to the blast furnace, being particularly desirable in the latter under certain conditions. The copper, up to the present, has been refined by the Balbach Smelting and Refining Company, of Newark, N. J.



"To return to the blast furnace: A little further detail will no doubt prove interesting. The plant is provided with ample dust chambers, and a periodical cleaning out of these chambers is made, the dust grouted with lime and charged wet into the furnace. The slag is run to waste through the granulating flume, and carried to the flats below, making excellent yards for the C. P. R.

"Last year I gave a few statistics, showing capacity of the big furnace. Unfortunately, we have rarely been in the position where we could push smelting, but during the week ending 18th of February, 1898, the tonnage smelted per day was as follows for seven days:— 277, 288, 297, 301, 310, 312, 246—a total during the week of 2,030.65 tons, made up as follows:—

Silver King ore .....	1,677.83 tons
Custom ore, etc.....	170.22 "
Limestone .....	182.60 "
	<hr/>
	2,030.65 "

"In two days, the 16th and 17th, we smelted 622 tons, made up as follows:—

Silver King ore .....	513.94 tons.
Custom ore.....	52.08 "
Limestone . . . . .	55.98 "

"This, I think, demonstrates what this furnace is capable of doing, and does away with the suggestion that a tonnage of over 300 may be charged into the furnace and not actually smelted.

"It will probably be of interest to state that we have made a test of coke from the Crow's Nest Pass ovens. I find that 135 pounds of this coke will, apparently, go as far as 150 pounds of that from the Coast ovens. A sample of this carload carried 8 % ash. The coke is well made, and promises to aid very materially the smelting industries of this part of the Province.

"During the months of March and April of this year, we made an experimental run on a lead charge. We attempted to purchase selected ores, carrying below 40 % lead, and preferably of an oxidized nature. We found, however, such ores were difficult to procure, and finally began operations with a calcined mixture, made up of mixed galena, War Eagle ores, and gold concentrates, 403 tons; of bedded ore, 176 tons; and dry ore, gold quartz carrying a little galena, zinc blende and pyrites, 75 tons, with 12 tons of low grade lead bullion bought from the Pilot Bay Smelter. This was fluxed with 245 tons of limestone and 30 tons of scrap iron, and the whole 940 tons carried: silver, 75,800 ounces; gold, 432 ounces; copper, 11,054 pounds; lead, 310,000 pounds. The bullion shipped averaged 600 ounces of silver and 4 ounces of gold per ton.

"We are now slowly accumulating, as before, lead ores of suitable character and grade, to make another similar run, and, I may say, are in the market at all times and willing to make bids as favourable as possible on ores of any description carrying copper, or on "dry ores," ores carrying a low percentage of lead. We are of the opinion that it is not economical to handle ores with a high percentage of lead, for the reason that the bullion shipped, having a higher railroad classification, pays a heavier freight than ore, and there is an additional duty of  $\frac{5}{8}$  of a cent per pound."

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**WEST KOOTENAY POWER AND LIGHT COMPANY.**

The West Kootenay Power and Light Company is a factor in the mining development of the District, of sufficient importance to merit place in this Report, its chief aim being the supplying of electricity for conversion into power and light in connection with mining operations.

The President of the Company is Mr. Oliver Durant, well known in connection with the Centre Star Mine, of Rossland, with Mr. L. A. Campbell, of the Canadian General Electric Company, as the installing expert.

The head office of the Company is at Rossland, while the power-house is situated at Bonnington Falls, on the Kootenay River some 10 miles below Nelson, and is a subject of illustration in this Report.

In the construction of the power plant advantage was taken of a large reef of rock cutting across the river, and over the lowest portion of which the river falls, while the power plant is located under the higher portion, through which a canal has been cut, bringing the water to the turbines.

The fore-bay is at present fitted with two 9-foot and one 10-foot steel penstocks, the two former only being used as yet, and convey the water to two pair of horizontal 39-inch Victor turbines, said to have a joint power of 2,900 horse power.

Connected directly with each of these pairs of turbines is a dynamo, making about 180 revolutions per minute, generating a current with voltage of 1,040.

The electricity here generated is carried to Rossland, a distance of 32 miles, over a very rough and heavily wooded country, sending a branch off to Trail and supplying power and light to the smelter there. At Rossland, this power is distributed and supplied to mines so desiring, at a price which is expected to be cheaper than the same could be developed by any private steam and engine plant.

Several of the mines are already equipped with motors for utilizing power in this form, while many others have ordered and are waiting for their machinery.

The Company has not been running long enough as yet to prove by actual work what it will do, but the complete success of similar plants elsewhere leaves but little for experiment.

I am indebted to the courtesy of Sir Charles Ross, one of the officers of the Company, for the following description of the plant :—

“The works of the Company are situated at Bonnington Falls, Kootenay River. The Falls, under a 40-foot head, are capable of developing 267,000 h.p. at low water mark. In order to utilize a portion of this power, the Company constructed a canal, 650 feet in length, and some 26 feet in width, through country rock ; it widens out into a fore-bay on the lower end, 54 feet in width, which is closed by a solid concrete dam, 32 feet high and 26 feet in width at the bottom, tapering to 6 feet at the top. At a point in the head-race, 150 feet from the concrete dam, between two high bluffs, a wooden dam is constructed sloping at an angle of 42 degrees up stream. This dam has a vertical height of 44 feet. All the timber, including the sills of this dam, are 12 by 12 inches, and are bolted solidly to the rock. The sills and timbers are spaced 5 feet ; the whole is planked with a double layer of 4-inch planking. In the bottom of this dam there are five sluice ways. Its object is to break the impact of water flowing from the canal at high water. The river at this point has an extreme difference of level of 32 feet. The main concrete dam is provided with three feeders, two of 9 feet and one of 10 feet. The up-stream ends of the feeders are closed by gates, 12 feet by 13, and one

13 feet by 14, made of wood. They consist of a framing, 12 inches by 12 inches, to which is solidly bolted 8-inch planking. The two outside frames extend upwards of 38 feet, and to each pit is bolted the racks for raising and lowering the gates. Each gate is further provided with a small iron flood-gate, 12 inches by 12 inches. The gates are raised and lowered by means of head gate irons, which are solidly bolted on to the top of the dam. These head gate irons consist of a winch, and can be operated by one man. At the back of the dam, a tail-race has been constructed, which runs at right angles to it, and consists of a pit, approximately 30 feet in depth, and 25 feet in width. In the clear water this is flanked by built masonry and concrete retaining walls, from 4 to 6 feet in thickness, extending upwards to approximately the level of the power house floor.

"Bolted to the ends of the two 9-foot feeders are 13-foot castings, each of which contains one pair of 39-inch horizontal, cylinder gates, Victor turbines. To the castings are bolted the draft tubes, which are 22 feet in length, and ten feet in diameter at the lower end. The casting is supported at either end by the retaining walls of the wheel pit, and is further carried by two "I" beams. From the end of the castings project the wheel shafts, which are connected to two 725 K.W. generators, of the three-phase alternating type, each weighing, approximately, 80,000 pounds. These are bedded on rock and concrete foundations.

"The fields are excited by means of two 40 K.W. 125-volt direct current exciters, directly connected on two horizontal, 12-inch, registered-gate Victor turbines. These are contained in cast-iron flumes, supported by transverse beams bolted to the main beams of the large wheels. Bolted to the cast-iron flumes are the draft tubes and feeders. The latter are connected to the castings of the large wheels, which derive their water supply therefrom.

"From the generators the mains are led off in underground waterproof ducts to the switch-board, which consist of two exciter panels, two generator panels, and two line panels.

"The power house is fireproof, and built of brick, extending clear across the wheel-pit, and contains the transformer house, the dimensions of which are 17 feet 6 inches by 28 feet.

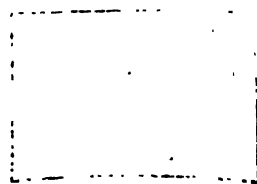
"In the transformer house are situated six air-cooled, 250 K.W. transformers, supplied with air by two 60-inch Buffalo blowers operated by two 2 h.p. induction motors.

"The distance from Bonnington Falls to Rossland, about 32 miles, is  
**Pole Lines.** spanned by two separate pole lines, with poles spaced 100 feet apart, each carrying three No. 2 B. & S. copper wires, supported on porcelain insulators of the triple petticoat type, which are supported on the cross-arms by 2-inch locust pins. On one line the cross-arms are snow-shedded. At the point where the line crosses the Columbia and Kootenay Rivers, are respective spans of 1,500 and 600 feet, the current being carried on bi-metallic wires. These lines have a feeder of some four miles into Trail. The current is carried from Bonnington Falls to Trail and Rossland at a pressure of 20,100 volts, where it is transformed down to a suitable pressure for use in the mines, towns, and smelters. The sub-station at Rossland is a fireproof building, 30 feet by 44 feet dimensions, with concrete floor, and contains six air-cooled 250 K.W. transformers similar to those in the generating station, with a duplicate blowing plant. In the sub-station is situated the switch-board, which consists of two line panels, two transformer panels, and four feeder panels, and a regulator for the regulation of the voltage on the town circuit. From here the electricity is distributed to the mines and the town.

"The sub-station at Trail is fireproof, and is built of brick, containing three 250 K.W. oil-cooled transformers and the necessary switch-board and instruments for distributing the current at a pressure of 550 volts to the Trail Smelter. The voltage on the Rossland secondaries is 2,300 volts."



BONNINGTON FALLS—INTERIOR OF GENERATING STATION.



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**ARROW LAKE, GOAT RIVER, AND NELSON MINING DIVISIONS.**

**REPORT OF JNO. A. TURNER, GOLD COMMISSIONER.**

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**OFFICE STATISTICS—ARROW LAKE DIVISION.**

Number of Claims recorded .....	250
"      Certificates of Work .....	184
"      "      Improvements .....	6
"      Bills of Sale, etc. ....	171
"      Abandonments .....	3
"      Placer Leases .....	4
"      Placer Transfers .....	8
"      Crown Grants .....	4
Free Miner's Certificates .....	230
Payments of \$100 in lieu of Assessment Work .....	5

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**OFFICE STATISTICS—GOAT RIVER DIVISION.**

Number of Claims recorded .....	233
"      Assessments .....	136
"      Bills of Sale .....	69
Free Miner's Certificates .....	141

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**OFFICE STATISTICS—NELSON DIVISION.**

Bills of Sale .....	909
Free Miner's Certificates .....	2,175
Locations, Mineral Claims .....	1,483
Assessments (including 9 under sec. 25 of Mineral Act) .....	1,549
Certificates of Improvements .....	59
Locations of Placer Claims .....	62

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**TRAIL CREEK MINING DIVISION.**

(ROSSLAND CAMP).

**REPORT OF J. KIRKUP, GOLD COMMISSIONER.**

I have the honour to submit herewith my annual report on the condition of the mines and mining properties in Trail Creek Mining Division.

I beg leave to state that the facts and figures which are embodied in this report have been furnished in response to my circular letter addressed to the various mine managers, superintendents, and others having mining interests within this Division. Though a number have failed to furnish direct information in reply to my inquiries, yet as will be seen from the report, nearly all of the principal mining properties have been heard from. Much of the information thus obtained has been tabulated, and comprises a very interesting record of the progress made in the mineral industry of this Division.

The statistics of ore production for the year show that about 116,367 gross tons of ore have been shipped from Rossland mines, an increase of 40,000 tons over the output for 1897 (72,000 gross tons).

The gross value of the 1898 output is, approximately, \$2,210,000, showing a very gratifying increase during the year, and denoting the sure and steady progress of ore production from the Rossland mines.

The successful flotation of the new Le Roi Company with a capital of \$5,000,000, and the rapid advance of its shares in England, is equal cause for congratulation with the able management of the *War Eagle* mine, as directed by its General Manager, Mr. J. B. Hastings.

This section of the Province seems to have entered on a career of great progress, and the phenomenal growth of the mining industry in this Division is especially worthy of note.

Placer mining is being carried on, on the Pend D'Oreille River and tributaries, but the results during the past season in most instances are not satisfactory.

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NOTE.—In the following reports, those marked \* include work done previous to 1898.

BRITISH AMERICA CORPORATION, LIMITED.

Chairman, Marquis of Dufferin and Ava.; Managing Director, Whittaker Wright; Resident Director, Hon. C. H. Mackintosh; Mining Engineer-in-charge, Wm. A. Carlyle, Ma. E.; Financial Manager, B. C., Edwin Durant.

The above Corporation now owns and is working the following properties in Rossland:—*Le Roi, Josie, Number One, Nickel Plate, Great Western, and Columbia and Kootenay.*

During the past year the *Le Roi* has shipped heavily, but on the others only development work has been prosecuted.

Superintendent, N. Tregear. Average number of men employed, 250.  
Le Roi. Shipments, 66,000 tons. Power plant—A 40-drill Rand air compressor, with three 100 h. p. boilers; a 300 h. p. two-drum, direct acting, steam hoist. Work done—150 feet shaft sinking; 2,350 feet drifts and cross-cuts; 280 feet raises and winzes.

This property passed into the control of the above Corporation, November 22nd, when shipments were temporarily cut down from 400 to 200 tons per day, to permit of more development work being done and to get well in advance of stoping or ore extraction.

The mine is worked through an incline shaft, 850 feet deep, with two hoisting compartments, and now 200, 350, 500, 600, and 700-foot levels are being extended westward. The main ore chute is over 400 feet long, and 6 to 30 feet wide, and on the 700-foot level a large body of ore, 35 to 40 feet wide, and already shown to be 200 feet long, is being worked. Here on the hanging and foot-walls are wide bands of good grade ore, while nearly all the intervening material, although of lower grade, is sent to the smelter. The present shaft is being sunk to the 900-foot level, but at the west end of the property, or 1,000 feet from the inclined shaft, it is proposed to shortly begin the sinking of a large vertical shaft, equipped with heavy hoisting plant.

This Company possesses an excellent smelter plant, situated at Northport, capacity 450 tons per day, which capacity may soon be doubled.

D. J. Macdonald, Superintendent. Number of men employed, 50. Columbia and Kootenay. On this property about 4,700 feet of work, comprising drifts, cross-cuts, raises and winzes, has been done, of which 3,200 feet is new work this year.

There are now five tunnels running into the mountain along the ledge, of which Nos. 3, 4, 5, and 6, are at present being advanced, the lower, or No. 6, being about 700 feet below the crest of the mountain and 400 feet above the bottom.

In these tunnels the vein is found to be very straight or with very few dislocations, and to vary in width from a few inches to over 30 feet of nearly solid pyrrhotite. Tunnels 3, 4, 5, and 6, are respectively 1,200, 800, 700, and 150 feet long, and are being connected by raises for ventilating and exploring purposes. Many cross-cuts are also being run, exposing large bodies of ore of varying value.

At the mine good and commodious buildings have been erected, and everything is now in excellent condition for work.

The twenty-drill Ingersoll-Sargeant air compressor supplies abundant power through a six-inch main, running up the hillside past the tunnels.

No shipments were made during the year.

Superintendent, W. S. Haskins. Number of men employed, 45. On Great Western and the *Great Western* a two compartment shaft was sunk 230 feet, and drifting Nickel Plate. has been in progress along the vein at the 200-foot level. However, sinking has been resumed and the 300-foot level will be run out when that point is reached.

Since pumping out the *Nickel Plate* in April, work has been confined to the 200-foot level, where nearly 2,000 feet of drifting and cross-cutting has been done, disclosing two veins, 300 feet apart, 6 to 30 inches wide, of chalcopyrite-pyrrhotite ore, assaying from \$2 to \$22 in gold, and 3 % to 12 % copper.

A 10-drill Ingersoll-Sargeant with two 60 h. p. boilers, water jet condenser, etc., supplies compressed air for these two properties when 5 to 7 drills are working.

Superintendent, Jno. M. Long. Number of men employed, 50. On Josie and Number One. the *Josie* work has been confined to extending the 300-foot level and its cross-cuts, and 1,250 feet of work is the result. To the east end a chute of good grade ore, as yet 50 feet long and 2 to 7 feet wide, is now being explored by a raise to the 100-foot level. In the west two veins have been found by cross-cutting, and drifts are now being run along these.

On the *Number One* only two or three shallow pits had been sunk. A tunnel was begun and driven 450 feet, disclosing one ore chute nearly 200 feet long, 2 to 7 feet wide, of quartzose ore carrying gold, silver and copper, with values varying from \$6 to \$25 per ton. East of this point a vertical two-compartment shaft was sunk 220 feet, and at the 200-foot level a drift has just disclosed a wide ledge running east and west, with a good width of ore near the hanging-wall. The west drift will be pushed under the ore chute found in the tunnel, and sinking will be at once resumed.

Power for these two properties is got from a four-inch main from the Le Roi compressor, and a steam hoisting plant is at each mine, where eventually electric hoists will probably be installed. Six drills have been at work, but soon ten to twelve will be running.

Total amount of work done—*Josie*, 1,250 feet; *Number One*, 700 feet; *Great Western*, 950; *Nickel Plate*, 2,400 feet; *Columbia and Kootenay*, 4,700.



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THE WAR EAGLE CON. MINING AND DEVELOPMENT COMPANY.

Directors—George Gooderham, President; T. G. Blackstock, Vice-President; Hon. Geo. A. Cox, W. G. Gooderham, W. H. Beatty, A. E. Gooderham, all of Toronto.

**War Eagle.** J. B. Hastings, Superintendent and Engineer. Average number of men employed daily, 175. Shipments in 1898, 42,779 tons. Net value of same, \$496,395.71.

**Centre Star.** This mine was extensively developed under its previous owners. It was purchased by Messrs. Gooderham and Blackstock from the old owners for \$2,000,000, cash. The plant comprises a 7-drill compressor, with pumps, etc.

The management, since October 1st, has been in the hands of Mr. J. B. Hastings, of the *War Eagle*. A new shaft is being sunk on the south face of Red Mountain on the property. Seventy-two men were employed daily since October 1st to December 31st. The mine is to be supplied with a first-class, up-to-date plant, and thoroughly worked under Mr. Hastings' direction. About 2,600 tons of ore were shipped from the mine under the old management.

## ENGLISH-CANADIAN COMPANY, LIMITED.

This Company, which has recently purchased the properties of the Fourteen Gold Mines Consolidated Company, consisting of a block of twenty-one claims, situated in the south belt, about two miles south of Rossland, has done development work to the extent of 90 feet of shafting on two of its properties, namely, the *Edna* and *J. & J.*, under the superintendency of Mr. M. A. Green.

## \* BIG THREE GOLD MINING COMPANY.

William Yolen Williams, Superintendent. The property of this Company comprises the *Mascot*, *Southern Belle*, and *Snow Shoe*. The *Mascot* is situated on Columbia Mountain, adjoining the *Columbia and Kootenay* mine. The *Southern Belle* and the *Snow Shoe* are situated on the north-eastern slope of Red Mountain. Development work on the *Mascot* comprises 575 feet of tunnelling and 300 feet of shafting and winzes.

The *Southern Belle* and *Snow Shoe* are being developed jointly. About 650 feet of tunnelling and 160 feet of sinking have been done. Number of men employed, 7. No ore has been shipped, though a considerable quantity has been mined. The pay streaks are small, but carry good values.

Heretofore hand power has been used. Recently, machinery has been introduced, and comprises one standard, class B. belted Ingersoll-Sargeant 7-drill air compressor, supplied by James Cooper Manufacturing Co., Montreal; one 3-chase synchronous motor, 75 K.W., 900 revolutions, with a voltage of 2,080, furnished by the Canadian General Electric Co., of Toronto. The West Kootenay Power and Light Co. furnishes the power.

Twelve men have been employed, but this is to be increased to twenty. Montreal capital is chiefly interested.

## CANADIAN GOLD FIELDS, LIMITED.

J. C. Drewry, Managing Director. This group comprises the *Sunset No. 2*, *Gold Hunter*, and *Alabama*. All are Crown-granted claims. From January 1st to November 30th the average number of men employed was 21. The plant comprises a 7-drill Ingersoll-Sargeant air compressor, an 80-h.p. boiler, hoist, complement of pumps, etc.

Since the beginning of the year the development work done was tunnelling, 103 feet; sinking, 280 feet; drifting, 380 feet; cross-cutting, 300 feet; and other work making a total

of 1,268 feet of underground work, in addition to a large amount of surface work. Pay ore has been struck on the 300 and 350-foot levels, and the chute is in course of development.

#### MISCELLANEOUS PROPERTIES.

*Iron Mask*—J. F. Herrick, Manager. Number of tons of ore shipped for 1898, 3,370. Net cash received from smelters, \$72,600. Power used, compressed air. Average number of daily employees, 32.

\**Virginia*—The shaft is down 400 feet; drifts, 816 feet; total, 1,216 feet.

One ore-body 25 feet wide. Number of men employed, 24. Plant, comprises one 35 h.p. hoist; two No. 5 Cameron pumps. Power is supplied by *Monte Christo* compressor. No ore shipments have been made.

\**Monte Christo*—Development work comprises 2,160 feet of tunnelling, 300 feet of shafting, 190 feet of raising, 2,400 feet of drifting; total, 5,050 feet. One ore chute 7 feet wide.

The plant comprises one 15 h. p. hoist; one No. 6 Cameron pump; one 80 h. p. boiler, and one 7-drill compressor. Work is at present suspended.

*Iron Horse*—Development work consists of a double compartment shaft  $4\frac{1}{2}$  by 9 feet in the clear, and sunk perpendicularly to a depth of 50 feet. It is the intention of the management to sink to the 300-foot level, and a 7-drill air compressor has been installed for this purpose. A new shaft-house has been erected, 30 by 60 feet, and a blacksmith shop and powder-house; also a compressor building, 30 by 50 feet. About 24 men are on the pay roll.

\**Iron Colt*—J. Ferguson McCrae, Secretary-Treasurer. Development work consists of 1 shaft, 75 feet; No. 1 tunnel, 65 feet; No. 2 tunnel, which includes the right-of-way through the *Alberta* tunnel for 354 feet; making a total of 1,068 feet. There are four open cuts, from 10 to 30 feet long, and 5 to 10 feet deep. The drifts from No. 2 tunnel are 136 feet west,  $27\frac{1}{2}$  east, and No. 2, west 29 feet.

Ore-body in No. 1, west drift, from 3 to 35 feet wide. Eight to ten men were employed. Power is supplied by a 5-drill air compressor plant. Shaft-house, 20 by 40, with 26 feet gallows. Work was suspended since January 15th, 1898.

*Evening Star*—The amount of development for the year 1898 consists of 260 feet of drifting, 85 feet in the upper tunnel and 175 feet in the lower tunnel. Two shifts, of two men each, are employed, working by hand. A new ore-body, about 4 feet wide and 20 feet long, as far as drifted on, was encountered in the upper tunnel; the ore averaged some \$24 per ton in gold. After encountering this ore-body, drifting was begun in lower tunnel some 60 feet below to cut the same ore-body, which it is expected to do very shortly as the present face is nearing the calculated position of the ore-body as met with in the upper tunnel. This work is being carried on under the superintendency of Roy H. Clarke.

\**Atlantic Cable*—Development work comprises  $27\frac{1}{2}$  feet of a shaft, well timbered; 55 feet of shaft straightened and re-timbered; total,  $82\frac{1}{2}$  feet. Also 122 feet of cross-cuts and drifts driven at the 100 and 200-foot levels. The power is supplied by a California horse whim. An average of 4 men has been the working force, but work was suspended at the date of the report.

*Deer Park*—Roy H. Clarke, Engineer-in-charge. The amount of development on this property for the year 1898 consists of 112 feet of sinking, making the vertical shaft 305 feet deep, and 300 feet of drifting, as follows:—173 feet on the 200-foot level (including a winze 22 feet deep), 97 feet on the 100-foot level, and 20 feet on the 150-foot level.

The shaft was sunk in ledge matter the entire distance, encountering in this year's development two pay-ore bodies, the first 5 feet wide and the second 2 feet wide, below the 200-foot level. Drifting on the 200-foot level showed considerable low grade ore, but was important chiefly as determining the course of the ledge.

The most important work was begun about November 1st, after the installation of a 7-drill compressor plant, 80 h.p. boiler, and two air drills, costing \$6,500. The ore-body on the 100-foot level, already opened up by a cross-cut 35 feet long, was further opened up by a drift to the north, 40 feet long, and the cross-cut was continued 35 feet west. The ore-body on this level was found to be about 20 feet wide, with high grade streaks in this body 2 feet wide, and extended north about 30 feet and southerly to an extent as yet unknown, the whole averaging about \$18 per ton. The same ore-body is now being encountered on the 150-foot level. The mine employs 15 men.

*Good Friday*—During the year 1898, the following work was done:—Tunnel No. 1, 238 feet; tunnel No. 2, 245 feet; tunnel No. 3, 98 feet; tunnel No. 4, 160 feet; tunnel No. 5, 37 feet; tunnel No. 6, 28 feet; total, 806 feet. Shaft No. 1, 18 feet; shaft No. 2, 31 feet; shaft No. 3, 35 feet; total, 84 feet.

There are 950 feet of surface cross-cuts, three-quarters of a mile of trail, and two log buildings. Number of employees, from 25 to 45. Large ore-bodies of varying grades have been encountered on the surface. Neither tunnel is far enough advanced to reach the ore-bodies or cross-cut the leads at the depth. Average cost of tunnelling, \$16 per foot; sinking shaft, \$22.

*\*Green Mountain Claims*—This property has been opened up by cross-cuts in 7 or 8 different places across the entire length of the claims. Development work comprises one tunnel, 35 feet; 1 tunnel, 65 feet; 1 shaft, 80 feet deep. A steam plant has been installed and a good machinery and shaft-house erected, also a good cook and bunk-house, 60x20.

*\*Giant*.—This property is situated on the west flank of Red Mountain. Development work comprises No. 1 shaft, 65 feet; No. 2 shaft, 115 feet; and tunnel, 125 feet. The ore showing is good. There are at least two distinct leads on the property. During the past summer 114 tons of ore were shipped from the *Giant*, which averaged \$17.00 per ton. Up to November 30th, 15 men were employed. Operations are suspended for the winter.

*\*Novelty*.—This property adjoins the *Giant* on the east. The shaft is down 40 feet. Tunnel No. 1 is in 45 feet, and tunnel No. 2, 160 feet. The ledge is 35 feet wide. A shallow cross-cut has been made. Six men were at work at the date of the report.

*\*Abe Lincoln*—W. T. McDonald, Superintendent. The shaft is down 197½ feet, with a cross-cut of 18 feet. Five stringers of pay ore have been encountered in the workings. Number of men employed, 7. The power is supplied by a horse whim.

*\*Grand Prize*—Two shafts of 25 and 38 feet, respectively, have been sunk on this property. Number of men employed, 3. It is intended to use a horse whim in deepening.

*Lily May*—W. J. Harris, Manager. Work was begun November 1st. Up to the date of the report, the shaft was deepened 20 feet. It is now down 125 feet and in ore all the way. The report states that the bottom of the shaft is now looking better than at any time during the history of the mine. The ownership will be transferred to the new English-Canadian Company on February 1st, 1899, and the necessary capital for the steady development of the mine is being furnished.

The plant comprises an 80-h.p. boiler, a 5-drill compressor, two machine drills, a blacksmith shop, shaft-house, machine-shop, boarding and bunk-house. No. of men employed, 9. Total amount of development work, 485 feet.

*\*Homestake*—T. H. Bain, Superintendent. This property is situated on the east side of Trail Creek, and is contiguous to the *Sunset No. 2*. Area, 21.3 acres. The main shaft is 10 x 6, 160 feet deep. The prospecting drift, 4 x 5, is 50 feet deep. The drift which connects the shaft is 75 feet long. A number of surface cuts have been made, and the ledge is exposed for 700 feet. Number of men employed, 13. The plant comprises a 5-drill compressor, 80 h.p. boiler and hoist.

*Commander*—W. J. Harris, Manager. Development work was commenced in August, 1898, and since then the shaft has been sunk 100 feet without encountering solid ore. The shaft, however, runs through mixed ore, and is down 280 feet, but no shipments of ore have been made. The power is supplied by a 60 h.p. boiler, and there are one 3-drill compressor, 2 power machines, a blacksmith shop, a shaft-house, bunk-house and boarding-house, and lodging-house, etc. The total work done is 875 feet. Drifting will begin at the 300-foot level. Number of men employed, 13.

*\*Velvet*.—John L. Monish, Manager. Development work comprises 4 drives, 4 winzes, shaft and tunnel. The north drive, at the 100-foot level, is driven 222 feet; the south drive, at the same level, 145 feet. The north drive, at the 160-foot level, is driven 151 feet; the south is driven 160 feet at the 70-foot level. No. 1 winze, at the south of the shaft, is sunk from the surface 100 feet; No. 2 winze, north of shaft, is down from the surface 100 feet; No. 3 winze, north of shaft, is down 60 feet from the 100-foot level; No. 4 winze, north of the shaft, is sunk from the 100-foot level 60 feet. Depth of shaft, 210 feet. The distance driven in tunnel is 54 feet. The shaft was sunk through ore from the surface to the 160-foot level. Ore was also encountered in the drives and winzes. Number of men employed, 28. Plant comprises 25 h.p. boiler and hoist. No market shipments of ore have yet been made.

*\*Santa Rosa Group*.—Development work comprises:—1 cross-cut tunnel, 406 feet; 1 drift, 35 feet; 1 open cut, 16 feet; 1 open cut, 12 feet; 1 shaft and open cut, 20 feet; 1 open cut 4 feet; 1 open cut, 6 feet; 1 shaft and open cut, 6 feet; 1 open cut, 10 feet.

No. 1 tunnel cuts the outcrop of a considerable lead about 40 feet wide, consisting of magnetic iron and copper pyrites, and is cut through almost its entire length, and is heavily mineralized. No. 2 tunnel is driven on a lead of decomposed ore, near a syenite and porphyry contact. Tunnels Nos. 3 and 4 open on the lead at a depth of 290 feet. Tunnel No. 6 opens on quartz syenite, and is free milling. No. 7 opens up a lead of galena, with carbonates. Nos. 8 and 9 are similar to 4 and 5. No. 10 tunnel opens up a lead 4 feet wide of magnetic iron, with solid pyrites and well defined. Number of men employed, 6. No plant in use.

*\*Waneta and Trail Creek Gold Mining Company*.—This group comprises the *Copper Bell*, *Copper*, and *Copper Glance*. Area, 140 acres, all Crown-granted. Development consists of one tunnel 25 feet, one winze 20 feet, one shaft 28 feet. The vein contains copper and galena. No machinery in use.

*\*Wallingford Group*.—The group comprises the *Wallingford*, *Minnie*, *Mine No. 1*, *Summit*, and *Wallingford Fraction*. 100 acres Crown-granted; 60 acres not Crown-granted. The development work, so far as done, is all on the *Wallingford*, and comprises 200 feet of tunneling; 40 feet of shafting No. 1; 14 feet of shaft No. 2; 45 feet open trench.

Ore contains gold, silver, and copper 20%. Car and track in use; also air-pipe in tunnel. Seven men were at work at the date of the report.

*\*White Bear*.—Location adjoining Le Roi ground. Length of shaft 250 feet, well timbered. Total drift work, 400 feet. Cross-cuts at the 100 and 200-foot levels show from 7 to 10 feet of ore. The plant consists of 60 horse-power boiler, 20 horse-power hoist, 1 4-drill

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compressor, 3 Rand drill machines, 1 station pump, 1 No. 5 Cameron sinking pump. Ten men are employed. J. Y. Cole is managing director.

*East St. Louis*—William J. Dunn, Manager. Up to December 31st, 1897, the shaft was down 32 feet. This has since been deepened to 54 feet, with 13 inches of clear ore in the bottom of the shaft. Cost of development work, \$475.

*Red Mountain and Ida May Mining Company*—Shafting, 14 feet, and other surface work. Cost, \$250.

*Royal George*—The report gives 22 feet of shafting and other surface work, at a cost of \$450.

*Florence*—The amount of work done consists of cross-cuts in the ledge, with plenty of low grade ore.

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OFFICE STATISTICS—TRAIL CREEK DIVISION (to December 24th, 1898).

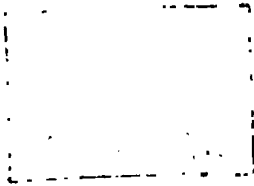
Number of Claims Recorded, (Mineral) .....	1,017
" " " (Placer).....	28
Certificates of Work .....	1,110
Money paid in lieu of work.....	16
Certificates of Improvements.....	130
Money in lieu of Certificates of Improvements.....	2
Bills of Sale, Transfers, etc.....	660
Abandonments.....	66
Miscellaneous Records ..	21
Records of Water (granted by Nelson office).....	25
Water Grants (this office).....	3
Free Miner's Certificates.....	2,890
Substituted Certificates .....	22
Free Miner's Certificates (companies).....	127



BLAST FURNACES—HALL MINES SMELTER, NELSON.



LADLING ANODES—HALL MINES SMELTER, NELSON.



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## LILLOOET DISTRICT.

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REPORT BY F. SOUES, GOLD COMMISSIONER.

The total ascertained yield of gold from the District is \$35,512, a decrease of \$4,328 as compared with the previous year. Mr. A. W. Smith, of Lillooet, was the largest buyer, and reports to me "that he has bought, during the year \$18,200. Year by year the amount is less, the quartz mining being the cause of a portion of this falling off. Had the miners paid as much attention to placer mining during the season as some have done during the past two months, the returns would have been very different, as those who were forced to resort to placer mining late in the season, to get something to winter on, made an excellent showing for the time they worked on the South Fork of Bridge River and Cadwallader Creek, showing that the large decrease in the yield, is not that there is no more gold, but is caused by miners not devoting their attention to placer mining the same as they did formerly."

This class of mining throughout the District has been greatly neglected, Placer Mining. and, as Mr. Smith points out, this is due to so much attention being paid to quartz prospecting.

Fraser River last spring, and again this Fall, was very low, giving ample opportunity to the itinerant Indian and Chinese, and I have no doubt that the greater portion of Mr. Smith's purchases were from these sources.

A large number of mineral claims (455) have been located during the Quartz Mining. year, and it is safe to say that only a small percentage of them will ever see any attempt at development. The greater portion of these have been located on Bridge River and its tributaries. Some 32 locations have been made on the base of the Marble Mountains, about 8 or 10 miles north-west from Clinton. With one exception, there has been no development work done on any of them. Assays, I am informed, have been had from surface croppings as high as \$30 per ton. Samples from different ledges, which I have seen, may be described as jasper quartz, dark gray quartz with hematite and quartz with associated pyrolusite and manganite.

Nearly 200 locations have been made on Bridge River and tributaries during the season. Considerable development has been made on some of them, but repeated applications to the managers have failed to furnish me with details. I understand that machinery is spoken of for some of them, but to what extent I do not know.

### MCGILLIVRAY CREEK.

A discovery of gold-bearing quartz has been made on McGillivray Creek, which falls into Anderson Lake from the north. Mr. F. Brett, one of the locators, reports on it as follows:—"The ledge is well situated for economic working at an elevation of about 3,000 feet above sea level. The vein does not outcrop, being covered by vegetation and detritus. The mountain side on which it is situated is very steep, at an angle of 30°, and admits of tunnelling directly on the vein on all the claims. The vein is a true fissure, averaging about 16 feet in width, vertical, with walls of schistose matter. The vein structure is laminated, and showing 'ribbon rock,' but the chief value appears to be in a hard vitreous quartz. A tunnel is now in 150 feet, showing a continuous ore-body. Assays give good gold values. Facilities for placing machinery on the ground are excellent. The claims are situated about 2½ miles from the mouth of the creek, and at an elevation of about 2,200 feet above Anderson Lake."



The specimens from this ledge, which have been forwarded to me, may be described as a milky-white, sub-translucent quartz, with thin veins of schistose matter and traces of iron, showing gold freely, but not as uniformly distributed as could be wished. McGillivray Creek was worked in past years for alluvial gold.

#### CAYOOSH CREEK.

The failure of the *Golden Cache* group of mines on this creek has had the inevitable result, for the time being at least, of practically putting a full stop to all mining and development work in their vicinity. On 43 claims, sufficient development work has been done to obtain certificates of work.

#### BLACKWATER.

Of the numerous claims recorded at this camp two years ago, I am not aware that any work has been done during the past year, and it is practically abandoned.

#### BONAPARTE RIVER.

The same remarks apply to this camp with regard to the large number of claims recorded on this river two years ago. They are all abandoned, and I regret to report that the development work on the B. C. Development Co.'s group of 12 claims has also been closed down, but I am unable to state the reason.

#### MAHOOD LAKE AND CLEARWATER.

Nothing has been done on the locations here in the past year, and only three new locations made.

Of minerals of commercial value, I have to report the discovery, on **New Discoveries.** Cadwallader Creek, of a ledge,  $3\frac{1}{2}$  feet wide, of sulphide of antimony. The next discovery is a ledge containing asbestos, described to me as situated on Upper Bridge River, and occurs in a well-defined, vertical ledge, from  $2\frac{1}{2}$  to 3 feet wide, showing on the surface for a lineal distance of 3,000 feet.

Another, and perhaps the most important, discovery is that of a soda lake, about 28 miles north from Clinton. The area of the lake is about 20 acres. The deposit varies in thickness, from 6 to 8 inches, thinning down at the edges to about 2 inches. Conservative estimates place the amount of mineral in the lake at about 20,000 tons. This Fall about 200 tons have been sawn out and brought to shore.

By request of Mr. Hoffman, Chemist and Mineralogist to the Geological Survey, I have forwarded to him, for analysis, specimens of the crystals, the water in the lake, and the sub-soil on which the mineral rests.

Mr. Hoffman advises me of the following analysis:—

Sodium Carbonate .....	35.54
" Bicarbonate .....	1.34
" Sulphate .....	0.14
" Chloride .....	0.02
" Metaborate.....	trace.
" Hydrogen, Ammonium Phosphate.....	0.02
Water.....	62.89
	<hr/>
	99.95

Lying in a north-east direction from the above referred to lake is another lake, also containing carbonates of soda; but the deposit is not so large, and is in separate patches, and apparently of a different composition. A sample of this deposit has been forwarded to Mr.

Hoffman for examination. Both lakes have been recorded as mineral claims, and are known as Lakes Goodenough and Last Chance, respectively.

**Hydraulic Mines.** The Lillooet Hydraulic Mining Company's lease, near Lillooet, has been worked during the past season, with satisfactory results.

Work has also been carried out on two of the leases on the South Fork of Bridge River. The greater number of such leases, however, have had no work done on them, although the holders are using every endeavour to enlist capital to aid them in commencing development.

In this class of mining, the New Fraser River Gold Mines Company, **Dredging.** at Big Bar, is the only one that has been in active operation, and it has been seriously handicapped. Caught in a rapidly falling river in November of last year, its dredger was frozen in for months, and did not commence operations until about the end of April, and was forced to stop work again, owing to high water and heavy drift, from about the end of May until the middle of August, when it continued, with successful and satisfactory results, until the 22nd of December, when severe weather again stopped it.

The Dominion Gold Dredging and Placer Mining Company has discarded its original dredging plant, and has this year constructed a powerful dredge of the dipper type, but I am unable to give full particulars. Unfortunately, the machinery was not completed in time for a test trial this fall, winter weather setting in early in December. On the other dredging leases held in the District no work has been done.

#### OFFICE STATISTICS—LILLOOET DISTRICT.

Recorded	mineral claims	455
Conveyances of	"	185
Certificates of Work,	"	209
Water grants for	"	4
Recorded	placer claims	16
Re-recorded	"	3
Dredging leases in force		18
"	" applied for	4
Hydraulic leases in force		45
Free Miners' Certificates		\$2,808.00
Mining Receipts General		6,355.35

#### YALE DISTRICT.

#### KAMLOOPS MINING DIVISION.

##### REPORT BY G. C. TUNSTALL, GOLD COMMISSIONER.

**Placer Mines.** The placer mines operated in this Division are with few exceptions of little importance. Placer mining is principally confined to a few Chinese on Traceyville, Scotch and Jamieson Creeks, who obtain small returns for their labour.

**Mineral Claims.** The dullness that prevails after mining excitements have subsided, has been dispelled by the strike in the *Pothook* mine, which has led to renewed activity in mining interests in the vicinity of Kamloops, and inspired confidence in their value and permanence.

The development of mineral claims is attended with an expenditure of time and money that few can afford. The prospector's labour ceases when he discovers deposits of a sufficiently promising character to justify expenditure, with the object of testing their value; but it remains with the capitalist to develop the hidden wealth and render it capable of being utilized for the purposes to which it is applied.

The large amounts asked for undeveloped property have, in some instances, prevented the introduction of capital, and defeated the object sought by prospectors, who were unmindful of the fact that but a comparatively small proportion of locations turn out to be mines after an expensive prosecution of work.

The Kamloops Division possesses a climate which enables prospecting to be carried on for eight months in the year. The grassy slopes of the mountains in this portion of the gold range afford an easy means of access in every direction. Wood is plentiful on the timbered summits, and water is available for domestic and other purposes. An excellent waggon road intersects the principal claims. The outlook from a mining point of view has never seemed so favourable. Cheap transportation is an important factor in mining, and this great advantage is afforded by the close proximity of the Canadian Pacific Railway.

I shall confine my observations merely to some of the most important claims to which sufficient work has been applied, to give some idea of their value.

The *Noonday* group is situated about  $4\frac{1}{2}$  miles due south of Kamloops.  
**Noonday Group.** It consists of six locations, the principal ones of which are the two following:—

The *Christmas* mineral claim has a shaft 6 by 7 feet, 14 feet deep, and 2 cross-cuts about 40 feet long, 3 feet deep and over 3 feet wide, run through surface gravel to strike the lode. The rock is free-milling quartz of a width of 10 feet, and assaying in gold and copper.

The *Noonday* mineral claim has three shafts, two of which are 43 feet deep, and one 23 feet. The vein-matter is auriferous quartz of a free-milling character; width of ledge, 10 feet.

**Kimberly Group.** This group embraces six claims, the principal location being—

The *Charlotte* mineral claim, which has a tunnel 200 feet long, a shaft 18 feet deep, and 40 cross-cuts and holes, exposing the lode a distance of 4,500 feet. The ore is chalcopyrite, with gold and silver values. The ledge is 35 feet wide on the surface.

The owners, Messrs. Fowler and Carter, are engaged extending the tunnel, which it is expected will strike the ledge in about 50 or 60 feet more. There are three defined lodes in this property.

A controlling interest in the *Python* mineral claim, of this group, has **Iron Mask Group.** been purchased by Montreal parties. The work done last summer has proved the continuity of the vein, which has been traced east of the shaft between 700 and 800 feet. Development will be commenced shortly.

A considerable amount of work has been done on the *Iron Mask*. It has a tunnel 135 feet long following the vein. At its extremity, a winze has been sunk 30 feet deep. The lode has been exposed by a cut on the surface between 600 and 700 feet. This has confirmed the opinion that the vein extends through the whole of the location. Three car-loads were shipped last season to Swansea, via Vancouver. These were sampled by Mr. Pellow-Harvey, and valued at \$1,537.92. The gross weight was a little over  $57\frac{1}{2}$  tons. The result proved very satisfactory, as one of the cars contained second grade ore. There is every prospect of this property being acquired by a strong company in England.

**Pothook Mineral Claim,** Bonded to Mr. Croft, of Victoria. Since its occupation, this mine has been steadily worked under many disadvantages. The broken-up character of the formation for a considerable depth exhibited at times very rich ore, which, later on, disappeared and was either replaced by low grade ore or became limited in extent. Notwithstanding these fluctuations, impelled by a belief that the deposit would be found intact below the point of disturbance, work was prosecuted with undiminished vigour until a cross-cut at the 160-foot level exposed a deposit of bornite copper glance and chalcopyrite.

A shaft,  $4\frac{1}{2} \times 5$  feet in the clear, has been sunk a depth of 226 feet through the ledge, which is between 300 and 400 feet wide. The cross-cut previously referred to is in a distance of 91 feet. The vein-matter is comparatively soft and easy to work, but, where the more solid mineral is encountered, the rock is hard and silicious. The formation of this portion of the Kamloops Mining Division exhibits but few rock exposures, and these are of igneous origin. The ore deposits are all contiguous to eruptive dykes.

The full expenditure to date has been \$32,000, including bond. About 20 men have been employed, but this number has been since reduced, awaiting the erection of a 10-h.p. gasoline engine to supply proper hoisting facilities.

**Erin and Jumbo Mineral Claims.** These claims lie about  $6\frac{1}{2}$  miles south-west of Kamloops. They are located on the western slope of Coal Hill, and are reached by an excellent waggon road.

The *Erin* is traversed by a ledge of gold and copper-bearing rock, which is well defined, and is developed by a shaft sunk on the foot-wall to a depth of 96 feet, dipping at an angle of 45 degrees. From this shaft, two cross-cuts have been driven 18 and 35 feet, respectively, but not far enough to strike the hanging wall. The vein-matter is a heavily oxidized, gossony material, with iron and copper pyrites. The shaft is not sufficiently deep to strike the solid ore where it would be free from oxidation. An adit tunnel, driven to cross-cut the ledge about 10 or 12 feet westerly from the shaft, has proved the ledge to be 60 feet wide from wall to wall.

The *Jumbo* is a fractional claim, which adjoins the *Erin* on the south. The lode found in the *Erin* apparently runs through this property.

**Sugar Loaf Group.** This group lies about seven miles south-west from Kamloops, and consists of five locations. The principal location is the *Chieftain* mineral claim, which has two shafts, each 50 feet deep, and one 8 feet. On the property are six ledges, from 2 to 20 feet wide. The vein-matter is a quartz containing copper pyrites.

**Cyclone Mineral Claim**—Mr. L. W. Nestelle reports having found a large deposit of copper glance in the vicinity of Jacko Lake, samples of which he exhibited, said to be taken from near the surface of the *Cyclone*. A ton of this ore has been sent to the Everett Smelter to test its value.

**Cherry Creek Group.** This group is situated about seventeen miles west of Kamloops, opposite William Roper's residence. The most work has been done on the *Copper King*, owned by Messrs. Hall & Morrell, who bonded it to Mr. Cotherill, of London, England, for \$25,000. The richer portion of the vein varies from  $2\frac{1}{2}$  to 3 feet wide, and shows high values in gold and copper. The assays justified development. A shaft was sunk a considerable depth to a point where the vein-matter gave out, and the bond was allowed to lapse.

The proprietors then resumed work, being of the opinion that the disappearance was caused by the dip of the vein. They started in at the side of the shaft, and in a comparatively short time exposed the ore-body to view. Messrs. Crippen and Connery, two experienced miners from Rossland, have since secured a bond on two-thirds of the property for \$20,000, and prepared a shipment of one car load of ore.

These mines have produced but 250 tons of iron ore this year, purchased by the Nelson Smelter for fluxing purposes. The Tacoma Smelter, which formerly obtained the whole out-put, ceased its demand in consequence of receiving ore for treatment which contained a quantity of iron. Next year, however, a large order is expected.

The Jamieson Creek locations are situated about four or five miles up Jamieson Creek the creek of that name, which empties into the North Thompson River Group. sixteen miles north of Kamloops. They have attracted considerable attention in view of a favourable report made by Dr. Dawson some years ago. The *Snowdrift*, *Osprey*, and *Razzle Dazzle* are among the principal locations. Most of the work has been expended on the last named, consisting of a shaft and open cut to intersect the vein, which is seven feet wide and exists in a slate and granite formation.

#### BIG SHUSWAP LAKE.

Negotiations are pending for the bonding of this mine to an English company. It is situated about four miles north of Sicamous, near the edge of the lake. This property exhibits a well-defined ledge nearly 50 feet wide, assaying gold.

#### KAMLOOPS LAKE.

Mr. S. McCartney, of Savona, has kindly supplied the following report on the Cinnabar and Copper mines situated on the north side of the western extremity of Kamloops Lake :—

The past season has been a quiet one in this part of the Division, but Mercury Deposits. has been marked by the discovery of some promising prospects and the inception of work upon them.

No work has been done on any of the claims of the Cinnabar Mining Company for the past season. It is a matter of regret that these properties have been so long idle, the money spent on them having been lavished on the more unpromising locations, and in building of a furnace not suited for such ore, as is shown by the fact that quicksilver can be panned anywhere in the gulch below the furnace. This loss is only a fraction of that which took place in the air as shown by the quicksilver in the flues. Mr. H. L. Lightner, the ex-superintendent of the Company's mines on Kamloops Lake, has lately made a thorough investigation of the mines and furnace, in the interests of the Cinnabar Company, with a view of making changes and commencing work at an early date on a firm business basis.

*Hardie Mountain Group.*—A considerable amount of work has been done this year on these claims on the mountain. Want of capital and the difficulties in contending with water have been drawbacks to development work on the high benches where most of the claims are situated. Work, as follows, has been done this season on some of the most promising prospects :—

*Columbia Mineral Claim*—60 feet of tunnel and 40 feet open cuts on the dykes. The cross-cut in the tunnel shows up a good body of furnace ore, assaying  $1\frac{1}{2}$  to 2 % quicksilver. Work will be continued during the winter driving the tunnel ahead on the dyke, developing the claim and assisting the drainage of the upper benches.

*Almaden Mineral Claim*—Development consists of 60 feet of shafts and open cuts. The prospect is good for a large body of furnace ore.

*Idria Mineral Claim*—50 feet of shaft and open cuts for this season's work, have been done on the dykes, water interfering with sinking. Further opening of the tunnel on the *Columbia* will have the effect of draining this claim so that work can be done much earlier next season.

*Martell Mineral Claim*—Mr. A. Hardie is at present engaged in running a tunnel to intersect the dyke from the present showing on the surface. More or less work will be done during the winter.

Work on other Cinnabar locations on the mountain this season consisted merely of superficial prospect holes, with not enough work done to warrant an opinion. In June last a very promising outcropping of cinnabar was discovered on 3-Mile Creek by H. I. Colquhoun, 15 miles south of Savona, proving the southward continuation of the quicksilver belt. Work will be done on this property in the early spring.

Assessment work has also been done on Cinnabar locations on Deadman's Creek. Particulars of work not at hand.

As to the copper claims east of Copper Creek, 60 feet of work has been done on the *Tenderfoot*. The work on this claim is so far superficial, but seems to show a large body of concentrating ore, some small rich veins also occurring. A trial shipment of the ore is now being made from the property, and will be followed by others if the results are satisfactory.

On the same ledge on which this occurs, work is being carried on this winter by A. G. Colquhoun on the *Progresso*, and G. F. Monckton on the *Newark*, on each of which claims it is intended to run a 100-foot tunnel. On the former claim, after driving for some distance through heavy surface, the vein has been tapped, and some fine looking ore is being extracted, which appears to occur in a large deposit.

On the *Sunlight*, adjoining this claim, work will be done by eastern parties this winter. The same veins traverse these two claims.

On the *El Ultimo* claim the assessment work has been done, disclosing a large body of low grade ore. If a concentrating plant were built large shipments of ore could be made; at present it is necessary to have high grade ore to pay the cost of transportation and expenses. This is pre-eminently a district of large, low grade deposits.

#### MAMETTE LAKE.

I am indebted to Mr. F. Wells for the following description of the Mamette Lake Mines. Mamette Lake mines, which are situated about 30 miles south of Savona and are connected with the waggon road that starts from that point to the Nicola Valley:—

The area which has so far been exploited and on which several locations have been made, lies some 2,600 feet above sea level. The country is mostly well timbered, and most of the rolling hills are covered with two feet or more of alluvial soil. Large exposures of the formation or country rock are the exception, but where exposed it is a green trap rock. A considerable number of small conical hills or buttes occur all through the valley; but where the formation is visible on the surface it is invariably a volcanic rock separate from the general country formation.

There are some ten claims located, and some good surface showings of copper sulphides have been found in all of them.

On a group of three locations, some four miles east of Louis Quienville's ranche, owned by Messrs. Dupont, Corning, and others, a shaft has been sunk between 60 and 70 feet, and three men are still at work sinking.

Some three miles to the N.W. of these claims are a group of claims at present under bond to the Hall Mines, Limited, of Nelson. Here again, high grade copper ores have been found, the red oxide or cuprite ore being in evidence. Some three or four men have been working on these claims for the last three months. Though the work has been more or less exploratory, it has resulted in about ten tons of high grade ore being obtained, which is to be shipped immediately.

The two groups of claims mentioned are located in a mineralized belt or dyke of volcanic origin, which, as far as exploited at present is thought to be from 800 to 1000 yards wide. The whole width is undoubtedly copper-bearing, as is evidenced by the very fine samples from the surface that can be obtained. More work will have to be done on these properties before one can speak with any certainty as to the future.

#### ADAMS LAKE.

It is the intention of the company owning the mineral properties situated on Adams Lake to erect, next spring, a small experimental plant for the purpose of testing the value of the different veins in their mines.

#### NICOLA LAKE.

To Mr. Arthur Potocke, of Nicola, I am obliged for the following report on the mines situated in the vicinity of Nicola Lake:—

The work done in the vicinity of Nicola this past year has not been extensive, but the results have been satisfactory.

*Peacock Mineral Claim*—The *Peacock* lies about 5 miles north of Nicola. It has on the surface an outcrop of mineral measuring 105 feet by 45 feet. A shaft has been sunk through 20 feet of heavily mineralized quartz, where the foot-wall was struck. A tunnel has been started to run along the vein. The showings on this claim are exceptional, for although only \$300 has been expended there is at present a large amount of copper ore in sight. The ore can be freighted to railway communication at Spence's Bridge for \$15 per ton.

*Boulder Cap Mineral Claim*—The *Boulder Cap* is an extension of the *Peacock*. A tunnel is in 24 feet, tapping the lode exposed by last year's shaft, enclosed in well-defined walls. Some of the vein-matter consists of a soft decomposed rock containing native copper. The country rock is a diorite and porphyry, which runs N.W. and S.E., with more or less indications of copper. Higher up and in contact with the diorite lies a large extent of granite in which some well-defined veins of peacock ore have been discovered.

*Culloden Mineral Claim*—The *Culloden* is situated one mile north of the Town of Nicola. The ore is of a low grade character, containing copper pyrites and silver in calcespar.

*Humming Bird Mineral Claim*—The *Humming Bird* lies adjacent to a deposit of magnetite iron ore, containing copper on the contact walls, below which some fine specimens of copper have been found. A tunnel is now being driven, on which work will be continued during the winter.

#### GILMOUR MOUNTAIN.

The Matthews Mining Company has done work on its properties. The ore found was good, but no defined vein was found. Work will be prosecuted next spring with the object of striking a permanent deposit.

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QUILCHENA.

Some work has been performed in this locality on a vein of peacock ore, from which a good assay was obtained.

## IRON MOUNTAIN.

The copper deposits on this mountain are again attracting attention. Assessment work has been completed on several of the locations.

## GRAND PRAIRIE.

*Henrietta Mineral Claim*—The vein in this claim is 3 feet wide. A shaft is down 30 feet. The ore contains copper, silver, and gold.

*Key Mineral Claim*—Has a tunnel run in a distance of 25 feet to vein, which contains the same kind of ore as above.

*Forest Queen Mineral Claim*—A cross-cut, 15 feet long, and cuts made in two other places on the surface. There is a small quantity of molybdenite in the vein-matter.

## SALMON RIVER.

*Iron Cap Nos. 1 and 2 Mineral Claims*—On No. 1 a shaft 12 feet deep. The lode is 50 feet wide. The ore contains iron pyrites carrying silver and gold. On No. 2 there is a shaft 9 feet deep; has the same character of ore as the above.

*Black Jack Mineral Claim*—Adjoins the last-named claims. The vein is 100 feet wide. The ore is magnetic iron, carrying a little gold and silver. But little work has been done.

*Deer Park Mineral Claim*—Has a vein 30 feet wide, principally white quartz, containing iron pyrites and silver.

*Dorothy Mineral Claim*—Five veins run through this property in a parallel direction. The ore is of the same character as the above.

## ASHCROFT.

The *Burr* group of eight claims is situated about  $5\frac{1}{2}$  miles east of Burr Group. Ashcroft, on the C. P. Railway, which runs through the property. It has a large body of ore, carrying gold and silver, but principally copper, and lies between diorite and granite. The country rock is diorite.

About 80 feet of tunnelling has been run in on the claims, which are most favourably situated for working, as the ore can be dumped into the cars without extra handling.

Four other claims adjoin the *Burr* group on the south-east, owned by Alex. Oliver and J. C. Knight, on which no work has as yet been done.

On the north-west side of the Thompson River, about four miles above Ashcroft, several claims have been taken up, on which considerable work has been done, and which resemble the *Burr* group in the nature and values of the ore. A fine ledge has been discovered here, about four feet wide, carrying free gold. Several fine specimens of quartz, showing free gold, have been brought to Ashcroft from this property, which is owned by J. Haddock and Sons, J. C. Knight, and R. Stewart.

## BONAPARTE RIVER.

On the Bonaparte River, about five miles north of Ashcroft and to the west of the Cariboo Wagon Road, Messrs. Ahearn and Campbell have opened up a ledge 8 feet wide, carrying gold and silver. On the Cornwall Range, Messrs. Bryan and Stewart have two claims on a ledge 10 feet wide, which assays well in copper and gold.



The *Cornwall* group of claims, four in number, is situated on the Cornwall Range about six miles from Ashcroft and  $\frac{1}{2}$  mile west of the Cariboo Waggon Road. Two ledges run through this property, one 8 feet, the other 10 feet wide, which carry gold and silver. About 40 feet of tunnelling has been done on these locations.

The claims of Messrs. Henderson, Shields, Robertson, and Van Dyke lie about 8 miles south of Ashcroft, near the Cariboo Waggon Road. A tunnel has been driven on the location owned by Mr. Robertson. On the Van Dyke claim a shaft 10 feet deep has been sunk, also an open cut which shows up a fine ledge.

An American company has taken up two claims on the Oregon Jack ranche, and is in about 50 feet on the ledge, which is a white quartz, 14 feet wide.

The *Commercial* group is situated on Langley Mountain. It contains a large deposit of quartz containing gold, silver, and copper, covered with a heavy iron capping. About 350 feet of tunnelling has been completed.

On the west side of the Thompson River, near the 89-Mile Post, Messrs. Thibadeau and Clark own two locations, on which 300 feet of tunnels have been driven.

The Ashcroft Queen Copper Mining Co. has a group of eight claims on 8-Mile Creek, on which considerable development work has been done. There are seven ledges running through the property, from  $2\frac{1}{2}$  to 30 feet wide.

In Highland Valley, Messrs. Kirkpatrick and Shuler have some claims on which a shaft has been sunk to a depth of 80 feet, but the water came in and further operations ceased until a pump and proper machinery can be erected. The ore carries gold and copper.

#### OFFICIAL STATISTICS, KAMLOOPS DIVISION (TO DECEMBER 14TH, 1898).

Free Miner's Certificates issued .....	353 = \$1,927.00
Locations recorded.....	364
Assessment Work recorded.....	232
Mining Leases issued.....	1
Mining Receipts, general.....	2,297.80
	<hr/> \$4,224.80

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#### YALE MINING DIVISION.

##### REPORT BY G. C. TUNSTALL, GOLD COMMISSIONER.

The Fraser River Consolidated Gold Company, Limited, has been engaged since January last in making extensive and costly additions and alterations to its plant (purchased from the B. C. Gold Dredging Company), which lies at Ruby Creek. The Company holds practically all the river bed between Ruby Creek and Yale, under lease.

The Beatty Gold Mining and Dredging Company, at Boston Bar, a few miles west of North Bend, has not had a clean-up this Fall. It also, has been employed in improving and enlarging its plant.

Hydraulic mining seems to have been pretty much at a standstill during the past season.

The Ottawa Hydraulic Mining and Milling Company took out about \$3,800 worth of gold from its holdings, situated about one and a half miles west of North Bend.

The Ashcroft Gold Mining Company spent the early part of the season in building a reservoir and getting water on its property, near Keefer's. The Company now finds that it cannot get enough water from the creek tapped, and is working at another, situated some three miles from the property. This property is considered one of the best of the bench claims on the Fraser River, the gold being exceptionally coarse. From a few hours' run this spring, with very little water, \$380 in gold dust was procured.

Chinamen in great numbers are working, principally below high water mark, between Hope and Lytton.

Opposite Emory, on Canyon Creek, there was quite an excitement this Fall, and numerous locations have been made, which, undoubtedly, will be worked in the Spring.

**Mineral Claims.** The *Queen* mine, near Yale, is at a standstill.

On Siwash Creek, the Gold Queen Mining Company and the Montrose Company has performed the yearly assessment work.

At Salmon River, the Allan-Grisby-Hannah Company is driving tunnels on its locations.

Near Foster's Bar, above Lytton, numerous locations have been made. Assessment work is being done by Messrs. Watkinson & Shannon on several claims.

Summit City, near Hope, has been very quiet this season, there having been no operations on the numerous locations near there.

Near Gladwin, the Miro Monte Mining Company has run a tunnel in over 200 feet on its claim, and expects to strike the ledge at less than 250 feet. When the ledge is reached, it is proposed to erect a stamp mill on the property.

At Thompson Siding, the Warren Company holds eight locations, on which the assessment work has been performed. Messrs. Wright and Barrick have also done the assessment work on their claims.

Near Agassiz is situated the *Empress* group of mineral claims, on which considerable development work has been performed, for which certificates of improvement have been issued.

At Boothroyd's, on the Fraser River, opposite Keefer's, R. E. Brown has seven locations, on which the annual assessment work has been performed.

About a mile west of Yale, and also near Botanic Creek, a short distance from Lytton, a few locations have been lately made, but no work has, as yet, been done.

#### OFFICE STATISTICS—YALE DIVISION.

Free Miner's Certificates issued, 473.....	\$2,803 00
Mining Receipts, General.....	3,797 45
	<hr/>
	\$6,600 45
Mineral Claims recorded .....	76
Certificates of Work.....	71
Certificates of Improvement .....	7
Placer Claims recorded .....	43
Placer Leases recorded .....	14
Permits to transfer Leases .....	13
Permit to re-locate Mineral Claim .....	1
Powers of Attorney .....	2
Declaration .....	1
Transfers of Mineral Claims .....	23
Transfers of Placer Claims .....	18

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Water Records, Placer .....	8
Notices filed .....	7
Water Records filed .....	3
Mining Leases .....	17

## GOLD YIELD.

The gold yield for the past season is, approximately, as follows:—

Hope .....	\$ 480 00
Yale .....	13,225 00
Spuzzum .....	1,500 00
North Bend .....	3,400 00
Lytton .....	21,900 00
Ottawa Hydraulic Mining Company .....	3,800 00
Ashcroft Gold Mining Company .....	380 00
Taken away privately (estimated) .....	5,315 00
Purchased by merchants at Ashcroft .....	6,000 00
	<hr/>
	\$56,000 00

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## SIMILKAMEEN MINING DIVISION.

REPORT BY G. C. TUNSTALL, GOLD COMMISSIONER.

The Similkameen Division is bounded on the north by the 50th parallel, south by the International Boundary, east by the 120th meridian and west by the Yale Mining Division. In point of natural beauty and mineral resources this portion of Yale District yields to none in the Province. It possesses an excellent climate, but though rich in natural wealth is comparatively unknown. Situated at a distance from the beaten paths of travel it has escaped that attention which more remote, but more accessible districts possessing railway and water communications, have attracted.

Until a few years ago the trail over the Hope Mountain, and that proceeding from Nicola through the Otter Valley, were the only means for the transportation of supplies by pack-trains to the population that still remained on the Similkameen, Granite Creek, and Tulameen River.

Since 1860, which dates the first discovery of gold on the Similkameen, Placer Mining. the Division has participated in all the vicissitudes that attend a placer mining camp, accordingly as old diggings became worked out and new ones found to supply their places. Of the many who mined on the Similkameen and Tulameen, and their affluents, in those early days, but few remain who can give a history of the mining operations that were carried on and the incidents associated with the stirring scenes they brought into existence.

The streams mentioned were worked, where necessary, by means of wing-dams, and paid from \$4 to \$20 per day, to the man. The returns from the Similkameen were uniform and continuous for many miles, but the Tulameen was termed "spotted," although large amounts were obtained in certain localities, and some of the creeks yielded excellent returns. The Cariboo excitement attracted many of the miners to the new El Dorado, influenced by the startling reports that filled the newspapers; and eventually the Chinese monopolized the placers, and mined all the available ground for many years after.

In 1885, John Chance discovered Granite Creek, and the Similkameen Division was again populated with whites, many of whom had been employed on the Canadian Pacific Railway, which was completed that year or shortly after. A lively town, called Granite City, sprang into existence with a resident Gold Commissioner and Mining Recorder. The creek contained the usual number of blanks and prizes, and exhibited a scene of busy activity throughout its course in the deep gorge cut through the mountains by the process of erosion. The claims averaged from \$5 to \$30 per day to the hand, and the probable total yield from the bed of the stream, and its benches, would approximate six or seven hundred thousand dollars.

No official record has been kept of the gold obtained from this Division since its first occupation, but it must foot up to a large amount.

In addition to gold, platinum is found in all the placers in this section of the country in sufficient quantities to render it of commercial value. In 1886, it sold in Granite City for 50 cents per ounce, and as its value became known gradually increased in price to \$4 per ounce. It is associated with iron, and contains a certain amount of iridium and osmium. For a number of years it was thrown aside as being worthless, and by this means many thousands of ounces have been lost.

This Division has produced some of the largest nuggets found in the Province. In 1886 two pieces were taken from Bear Creek worth \$400 and \$415, respectively. The following year a Chinaman working for a company on Boulder Creek unearthed a nugget of the value of \$900. This was concealed and sold to Wells, Fargo & Co., bankers, Victoria, who placed it on exhibition in their window that winter.

The long period during which the placers in the beds of the streams and creeks have been worked without intermission, has naturally exhausted them of their wealth, and attention is now being devoted by capitalists to the benches which have lain idle owing to the expense incurred in obtaining water to work them. The principal companies at present engaged in preparations for mining their leaseholds on a large scale are the Slate Creek Mining Co., A. Swan, Manager; the Vermilion Forks Mining Co., W. J. Waterman, Manager, and the Golden Creek Mines Co., Capt. S. F. Scott, Manager. These properties are all deemed valuable, and employ a large number of men. The Granite Creek Mining Co., R. Stevenson, Manager, has been working ground that had been previously drifted, and the returns have been much smaller than expected, but as operations next summer will be confined to unworked gravel that will probably realize their anticipations.

The waggon road from Nicola to Granite Creek, constructed within the last few years, has been extended to Princeton, now supplies an easy means of communication. The stage from Spence's Bridge connects every week at Nicola with the Granite Creek and Princeton stage.

The following is a table of distances :—

From Spence's Bridge to Nicola .....	50 miles.
From Nicola to Aspen Grove.....	20 "
Aspen Grove to McCullough's .....	10 "
McCullough's to Thynne's.....	14 "
Thynne's to Granite Creek .....	16 "
Granite Creek to Princeton.....	12 "

Mr. Hunter, the Mining Recorder for this Division, reports a great reduction in the yield of gold and platinum, but an increase in the records of mineral claims. There have been no claims taken up by Chinese the past season, the greater number of them working for wages.

The Slate Creek Mining Co. has been prospecting its ground looking for an old channel, which report says it has found. It is at present running a tunnel through which to take a flume.

The Granite Creek Mining Co. has been working this season with about 25 men, but as the ground piped had been already worked, a large clean-up could not be expected. The Company will start on new ground next spring for the first time, and good results should be obtained as gravel in the face prospects very well.

The Similkameen Gold Gravels Exploration Co., whose property is situated on the right bank of the Similkameen River, has bonded its property to Dr. Bell-Irving, of Vancouver, who prospected the ground for a few weeks this summer, with satisfactory results.

The Vermilion Forks Mining Co., Limited, whose property is in charge of Mr. W. J. Waterman, a mining engineer of wide experience, has constructed a flume over a mile long, to convey water to the benches acquired by lease, but the cold weather suspended further operations.

The Gold Creek Co., S. F. Scott, Manager, has constructed a flume and brought water on one of the benches and washed a considerable quantity of gravel, but was unable to clean up in consequence of the ground being frozen.

At the head-waters of the Tulameen River, a belt of limestone extends seven miles east and west and about four miles wide. This formation contains a large quantity of galena, on which locations have been made, which in some instances are remarkably rich in silver.

#### GRANITE CREEK.

The *Mountain View*, John Amberty, of Granite Creek, owner, has a tunnel 20 feet long, 7 feet by 7 feet.

The *Josie*, owned by C. McDonald, of Vancouver, joins the *Mountain View*. An open cut has been made through rock, 12 feet long.

The *Morning Star*, A. D. Ross, of Granite Creek, proprietor. A tunnel has been run a distance of 30 feet. The vein is 6 feet wide. The assays show silver, lead, and a trace of copper. Some thirty feet above this lode a deposit of ore shows values in gold and silver.

The Star Mining Company, of Terre Haute, Ind., has run a tunnel to tap the ledge, some 90 feet in length, on the *Sutter* mineral claim. The ore on this and the foregoing claims is galena.

#### TWENTY-MILE CREEK.

On Twenty-Mile Creek, a tributary of the Similkameen River, some forty mineral claims have been located and recorded this year. Some of the assays in this vicinity show \$129 in gold and copper to the ton.

The *Rollo* mineral claim is situated on this creek and is owned by Peter Scott, of Fairview. The work done on this property consists of rock cuts 24 feet long, from 6 to 10 feet deep, and 4 to 5 feet wide.

The *Climax*, H. W. Yates, of Fairview, proprietor. Open cut in rock 16 feet long, 10 feet deep.

#### COPPER MOUNTAIN.

Copper Mountain is about 12 miles from Princeton, in a south-westerly direction. It is noted for immense deposits of copper of a rich character, which have attracted a great deal of attention.

The *Sunset* mineral claim, owned by R. A. Brown and Flora Averill, of Grand Forks. Title, Crown grant. The lead from the cropping on the surface to the bottom of the shaft is said to assay 12 % copper.

The *Copper Farm* group, includes the *Copper Farm*, *Helen H. Gardner*, *Humbolt*, and *Vancouver* mineral claims. Two thousand dollars was spent on these locations this year.

The *Copper Bluff*, Jackson and Mills, of Princeton, proprietors. Open rock cut 20 feet long, 5 feet wide and 9 feet deep. Assays show good values in gold, silver and copper.

The *Copper Reef*, *Copper King*, and *Copper Bench* are owned respectively by Messrs. Thomas, Jacobs, and McDiarmid. The *Copper Reef* has a shaft in rock 21 feet deep; the *Copper King* a shaft 12 feet deep, and the *Copper Bench* a shaft the same depth as the former.

*Princess May*—owned by Charles Powell, of Republic, Washington. Rock shaft 4 x 8, 4 feet deep.

*Sunrise* has a shaft 10 feet deep. This claim adjoins the *Sunset*.

*Sultan*.—This location is situated on the west bank of Similkameen River, owned by Murphy and Kennedy. A tunnel has been driven into the hill, the vein-matter being quartz.

#### OFFICE STATISTICS—SIMILKAMEEN DIVISION.

Free Miner's Certificates issued .....	153 = \$ 950 00
Location Records .....	288
Certificates of Work .....	67
Conveyances .....	85
Certificate of Improvement .....	1
Mining Leases .....	9
Crown Grant .....	1
Mining Receipts, general .....	3,538 70
	<hr/>
	\$4,488 70

Before concluding, I wish to acknowledge the valuable assistance obtained from Mr. Hunter, the Mining Recorder at Granite Creek, and Mr. Dodd, who occupies a similar position at Yale. They seem to have forwarded full and accurate statements of the mining interests in their respective Divisions.

#### HARRISON LAKE AND VICINITY.

The following has been received from Mr. John R. Brown, of Harrison Hot Springs:—

"In answer to your request for some information relative to any new discoveries or development work on mineral locations in that part of Yale District bordering on Harrison Lake, and vicinity I beg to say:—

"As you are no doubt aware, both the Districts of Yale and New Westminster meet here, and as my operations have been principally confined to that of New Westminster, I fear I can give you but a slight idea of the importance of the many new discoveries and development work done in the past year in this portion of Yale District.

"About three miles south of Trout Lake, an English corporation owning a group of mineral claims is developing a very promising-looking vein of high grade copper pyrites, which is 4 feet in width. Some 200 feet of tunnelling has been done, and a contract for a tunnel 300 feet in length, in order to tap the vein lower down, has been given. This is a very promising-looking proposition.

"Near Trout Lake, the scene of the first mineral discoveries of recent years in this vicinity, the assessment work only has been done. The ledges here are very large, but low grade, requiring expensive machinery to put them on a paying basis. No doubt this will come in time, and there is every probability that we shall have some big permanent mines there yet.

"On Harrison River, some fairly high grade ore (gold-copper) has been uncovered, but seems to be much ribboned and with no defined walls. It is simply a prospect with an undetermined value.

"On Silver Creek, some development work is now progressing, but in a very desultory way. This is a promising field for the prospector, but, so far, no capital has got in.

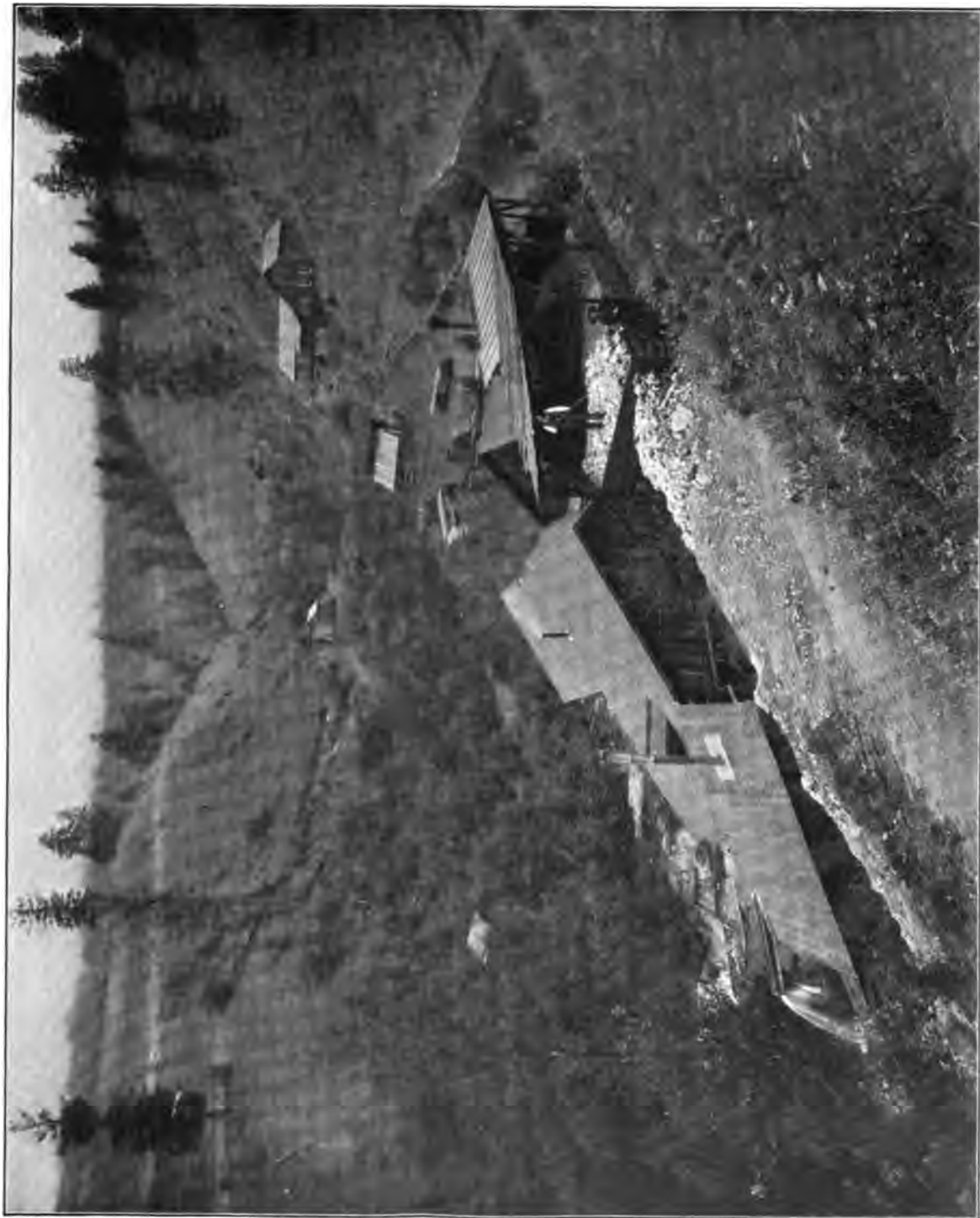
"The owners of the *Providence* mine, directly opposite Silver Creek, are pushing development work, and are now installing a Leffel wheel, air-compressing plant, and some other machinery. This property promises to make a very good mine. Immediately adjoining the *Providence group*, Dr. Langis and Mr. Whatley are cross-cutting to tap the leads of the *Providence*, and are well equipped for the work.

"The Fire Mountain discoveries and development of the past two years have given an impetus to the development of the country north of Harrison Lake, and some very fine discoveries have been made on John Gowan's Creek, in Yale District. Both copper-gold ores and high grade galena have been found here; in fact, a very large and rich district seems to be opening up in this vicinity, and it needs but one dividend-paying mine to send the country ahead, with very great chances of permanency.

"A great amount of placer ground seems to exist along the banks of the Lillooet River, with a good many benches fit for hydraulicing. No doubt there is a good deal of gold in this gravel, as the Indians in the different settlements along this river always sluice when the water is low and the dollars scarce, with very fair results for the amount of work they put into the business.

"The town of Tipella, the head of navigation on Harrison Lake, is now the point of departure for this interior country since the Government has put a bridge on the Lillooet, six miles above this town, and already the town does quite a business in supplying and forwarding goods for the different camps which have sprung up—in fact, it is now the easiest and shortest route to the Pemberton Meadows, Anderson Lake, and Lillooet and Bridge River, and will eventually tap these by railway as the shortest and most economical route, and opening up a great agricultural as well as a very promising mineral country. With a little over 100 miles of rail, and the all-year-round water route of the Fraser, Harrison River and Lake, this great interior country will be in a position to show its value, tapping the resources of the three great Districts, Yale, Lillooet, and New Westminster. As this entire country is developing very rapidly, no doubt the necessity for this railroad will be realised and acted upon in time.

"I trust that you will not consider these last remarks a digression from the main subject—the mines."



STRATHYRE QUARTZ MILL, FAIRVIEW.





## OSOYOOS MINING DIVISION.

C. A. R. LAMBLY, GOLD COMMISSIONER.

## CAMP FAIRVIEW.

Taken from the report of Mr. Jas. R. Brown, Mining Recorder, Osoyoos.

Crown-granted; owners, Messrs. Mangot and McEachern. There are **Morning Star**, two veins on this claim, known as the east and west veins. The vein-matter is blue quartz carrying galena, gold, and iron pyrites. On the west vein a shaft had been sunk 60 feet, and a new whim set up, and is now being further sunk, probably to the 200-foot level. At the bottom of the shaft, at present, the vein shows very strong and is about 5 feet wide.

From the east vein at the 25-foot level 300 tons of ore were milled at the *Joe Dandy* mill, and ran about \$10 to the ton.

Grown-granted; owners, the Winchester Gold Mining Company, Ltd.

**Stemwinder.** There are three well-defined veins on this property, the widths of which on the surface vary very much, but all appear to increase as depth is obtained, the gangue being a very compact quartz. Free gold is disseminated through the ore-body, which also carries chalcopyrite, iron pyrites, and galena. The bulk of the ore is free-milling, the percentage of the concentrates being from one and a half to two per cent., average assays from the ledge running about \$9 per ton. The ledges are named the Main, North, and South.

On the Main ledge the work this year was continued from the end of the drift previously driven at the 72-foot level, and the work was extended 66 feet N. 58° W. At this point an inclined shaft was sunk and is now down 170 feet.

On the North vein, the drift from the Main ledge having intersected the vein at the 84-foot level, the shaft is being further sunk at the rate of ten feet a week, the intention being to sink to 300 feet. There has also been sunk on the ledge an incline shaft of fifty feet, showing both hanging and foot-wall well defined. The vein is similar to the Main and South veins, and at the 50-foot level is 5 feet wide and very regular. A cross-cut tunnel, mentioned above, running from the Main vein, intersects this vein at 84 feet from the surface, and from the point of intersection, a drift is run in an easterly direction, for 20 feet, and an upraise of 68 feet, taps the above-mentioned shaft 44 feet from the surface. This work is all on the ledge which shows, especially in the drift, strong and regular and uniformly mineralized. The Company made a mill test of about 200 tons of ore, which was put through the *Tin Horn* mill and yielded \$6.50 per ton.

Good buildings have been erected by the Company, who have in position a 4-drill compressor plant, Dow vertical sinking pump, a 30-horse-power hoisting engine, and 3 Rand rock drills.

Crown-granted, owned by the Tin Horn Quartz Mining Company, Ltd.

**Tin Horn.** The work done this year consists of a continuation of the upper tunnel about 100 feet further.

The properties of this Company consist of eight claims, viz.: *Empress Cascade Mining of India, Empress of China, Empress of Japan, Empress of Russia, Syndicate. Dominion, Gold Kettle, Jubilee, and British Standard.* These properties were located by Mr. Fleming Robinson, for a Vancouver syndicate.

*British Standard* has a strong ledge 16 feet wide, carrying gold, silver, copper, and iron pyrites. The ledge was cross-cut and a depth gained on the hanging-wall of 12 feet. On all the claims good surface showings are to be found, but as yet little work has been done.

**Oro Fino Gold Mining Company.** This company owns the *Oro Fino*, and *Independence* mineral claims on McCaig Mountain, the ore in which is free-milling gold and carries a little silver. There are three ledges running across the claims.

At the discovery post on the *Oro Fino* there is a big cropping of quartz, from 8 to 9 feet wide, which was cut through to the foot-wall and a shaft sunk 22 feet. A tunnel was then run along the ledge and a good clean wall was found, and the tunnel continued along it for 75 feet. The ledge is from  $1\frac{1}{2}$  to 7 feet in width. Seventy feet north-west is another ledge of similar quartz showing free gold and a little galena. An open cut was run for 30 feet, and the ledge, as exposed, varied in width from 1 to 2 feet. A tunnel was then started on the ledge as it entered the mountain, where it had now increased in thickness to 3 feet, and continued to widen as the tunnel proceeded. When in 22 feet a smooth clean wall was encountered where the ledge was fully 5 feet thick. Twenty feet below the open cut, and about 75 feet south-east from the cropping, a shaft was started and the ledge was found about 8 feet from the surface. The shaft was sunk 48 feet, and a tunnel was then started from the bottom of the shaft to strike the ledge to the north-west, and was extended a distance of 78 feet. At the upper end of the *Independence* claim a tunnel has been run for 65 feet, where the ledge varies from 2 to 6 feet in thickness. The ledge was stripped at about 70 feet from the summit and found to be 9 feet wide, of solid quartz, and a tunnel was run in on the ledge for 50 feet, when a clear smooth wall was met with, having the same dip as the *Oro Fino*, and directly in line with it. The wall was followed for 25 feet and a shaft started and sunk 9 feet. Further down the mountain some 80 feet, a second cut was made and a tunnel run in 30 feet, where quartz was found, but water coming in work was stopped. To the west of the discovery post, a third ledge was found on which a shaft was sunk to a depth of 54 feet. The ledge is well defined between walls and varies from one to four feet, the vein-matter being a bluish quartz carrying iron.

The Company has great confidence in its properties and is going to at once erect a small test mill of three stamps. There are now about 5,000 tons of ore on the different dumps, which has been estimated by Mr. Pellew-Harvey to be of an average value of \$10 per ton. The mill-site is about one and a half miles distant, having an easy grade from the mines, and a road has been made from the mill to connect with the Penticton waggon-road.

Crown-granted. Owned by the Smuggler Gold Mining Company.

**Smuggler.** Since last report the tunnel has been driven to a length of 350 feet, which at 312 feet connects with a shaft 200 feet deep. Drifts have been run both north and south, at 50, 100, and 200 feet. There are 3,000 tons of ore on the dump and a large body is exposed in the mine. A 20-stamp mill, capable of crushing about 40 tons daily, is now in operation, and, while only just started, promises good returns. The indications are that the *Smuggler* will become a dividend payer in the near future. A competent mining engineer will take charge of the operations of the Company in January next, and further development work will be pushed right along.

#### CAMP MCKINNEY.

I am indebted to Mr. H. Nicholson for the following particulars regarding this camp:—

These two claims formerly owned by the Cariboo Gold Mining and Cariboo-Amelia Milling Company, of Spokane, have now passed into the possession of the Mineral Claims. Cariboo Consolidated Gold Mining and Milling Company, of Toronto; Robert Jaffery, President; Geo. B. McAuley, Mining Director, with head offices at Camp McKinney. Capital stock, \$1,250,000.00, in 1,250,000 shares of \$1.00 each, now quoted at \$1.25. In addition to the *Cariboo* and *Amelia*, the present company own the *Alice*, *Emma*,

and *Maple Leaf* claims to the west, and the *Saw Tooth Fraction*, and the controlling interest in the *Okanagan* claim to the east. The work of the company is at present confined to the *Cariboo* and *Amelia* claims, and Superintendent Keane gives the following as the result of the year's work: 7,530 tons of ore crushed, 11,000 ounces of bullion produced; value, \$12.00 per oz., \$132,000. Two hundred and sixty tons of concentrates produced, value, \$80 per ton, \$20,800. The mine development consisted of 950 feet of drifting in the fourth level, and two upraises, of 85 feet each, to the third level. The fourth level is 250 feet below the surface at shaft. The shaft is now being sunk to the fifth level, which will be 350 feet below the surface when completed. Up to October 1st, 10 stamps were in operation, since then, 20 stamps. The mine is equipped with steam pump and hoist and compressor drills, and the mill with a Gates rock crusher and Wilfley and Johnson concentrators. There are between 50 and 60 men on the pay-roll.

This claim lies nearly 1,500 feet south of the *Cariboo*, and is owned by Minnie-ha-ha the Minnie-ha-ha Gold Mining Company, of Toronto; President, Professor Mineral Claim. H. Montgomery. Capital stock, \$1,000,000 in 1,000,000 \$1.00 shares, 525,000 of which have been set aside as treasury stock. Present price of shares, 19 cents. The work done on the claim consists of a working shaft 103 feet, with 24 feet of cross-cutting and 185 feet of drifting. The mine is furnished with a double cylinder hoist, steam pump and drills. There are good bunk-houses, a boarding-house, and an assay office, etc., on the properties. The character of the ore is free-milling and concentrating, the vein being white quartz, carrying iron pyrites and galena, with a little blende and chalcopyrite. The mine is under the superintendence of Major Ainsley Megraw.

South of the *Minnie-ha-ha* is the *Big Bug*, upon which is a 30-foot shaft.

Sailor Title, Crown grant. This claim joins the *Minnie-ha-ha* on the north west, and is now under bond for \$15,000. On it is a very strong vein, Mineral Claim. presumably the same as the *Cariboo*, which has been exposed for 700 feet. Three shafts have been sunk in this vein, the deepest being 30 feet, shewing some high grade sulphurets. The ore is free-milling and concentrating.

Adjoining the *Sailor*, and between it and the *Cariboo*, are the *Rover* and *Kamloops* claims.

A fractional claim, adjoining the *Sailor* on the north. This property Annie L. has recently been incorporated in Spokane, and is now owned by the Little Mineral Claim. Cariboo Gold Mining Company; capital stock, \$100,000, in 1,000,000 10-cent shares. A small shaft, 15 feet, has been sunk in a 4-foot vein of bluish quartz, carrying a small amount of pyrites. This shaft is being sunk 50 feet.

The *Dolphin*, lying south-west of the *Annie L.*, is one of the old locations. A tunnel 75 feet has been run to intersect one of the three veins in the claim. The vein of quartz is about 8 feet wide, showing pyrites and galena, giving a fair assay in gold.

The *Eureka*, east of the *Dolphin*, is also one of the old locations, and is owned by a New York company. A great deal of work has been done on this property in former years, but nothing lately.

These are two claims to the north of the *Eureka*, upon which a nice, Pandre and Alma though small vein of white quartz, carrying gold, has been discovered. On Mineral Claims. the *Pandre* a working shaft has been started, now down 12 feet. The vein has also been opened up for 100 feet. On the *Alma*, two shafts have been sunk on the vein to a depth of 10 feet each, at which depth the vein would appear to be about 18 inches wide.

This claim is about 2,000 feet east of the *Cariboo* and is supposed to be on the same vein. It is owned by the Waterloo Gold Mining Company, of Spokane, with head offices at Camp McKinney. Capital stock, \$100,000, in 1,000,000 10-cent shares, now quoted at 9 cents. The quartz is of a bluish colour, similar in character to the *Cariboo*, and bunches containing free gold have been met with in sinking No. 2 shaft. The vein is well-defined, and averages over 6 feet in width. Two shafts have been sunk on the vein, 390 feet apart, the west or No. 1 shaft is 4½ by 9 feet and is 50 feet deep; the east or No. 2 shaft is 5 by 7 feet, and 70 feet deep.

Adjoining this claim on the west, and between it and the *Cariboo*, is the *Wiarton*; title, Crown grant, owned by the Camp McKinney Development Company. Capital stock, \$600,000, in \$1.00 shares. No work has been done on this claim this year.

The *Fontenoy*, title, Crown grant, adjoins the *Wiarton* on the east, the side line being 60 feet from the east shaft of that claim. There is an 80-foot shaft showing 5 feet of sulphide ore, also an open trench exposing the easterly and westerly *Waterloo* vein. Adjoining this property on the south-east are the *Vernon*, title, Crown grant, and the *Islander* just surveyed for Crown grant.

This claim is situated nearly two miles to the eastward of the *Fontenoy*, the intervening ground having been located since the strike on the *Waterloo*, and is owned by the Rock Creek Mining and Milling Company, of Victoria, but no work has been done on it this year. The old workings consist of two tunnels, 234 feet and 205 feet, incline shaft 106 feet, upraise, 245 feet, and 300 feet of drifting and stopping. The character of the ore is iron pyrites, blende and galena in bluish quartz of high grade; a shipment of 30 tons of sorted ore giving 2.15 oz. gold, and 5.2 oz. silver, net, per ton.

The *Old England*, title, Crown grant, adjoins the *Victoria* on the same vein. The development work here consists of three tunnels, 90 feet, 50 feet, and 52 feet, and an 80-foot incline shaft, a portion of which work was done this year. The character and value of the ore is similar to that of the *Victoria*. Adjoining the *Old England* are the *Homestake* and the *Peerless*, the former with a 60-foot, and the latter with a 15-foot tunnel. These three claims called the *Old England* group, are owned by E. James and H. Nicholson.

The *Eldorado*, situated on the North Fork of Rock Creek, about three-quarters of a mile east of the *Old England* group, has a 90-foot tunnel, shewing a big body of bluish quartz, carrying pyrites and blende. In the vicinity lie the *Cooper* and *Prince of Wales* claims, where recently discoveries of small veins of rich ore have been made.

The *Gold Standard*, adjoining the *Ophir* and *Snowdon* claims, near the falls of Rock Creek, has had some work done on it this season by the present owners, the Lemon Gold Mining Company, of Omaha, Neb.

The *Le Roi* and *War Eagle*, 4½ miles from Camp McKinney, and lying between the North and South Forks of Rock Creek, show considerable development work, there being some 500 tons of sulphide ore on the dump, carrying fair gold values. Adjoining these properties are quite a number of locations upon which assessment work has been done.

The *Highland Chief* and *G. M. Bennett*, lying north of the camp, have had a considerable amount of work done on them, but not enough to determine their values, and the same observation applies to the *Cameronian* and *Picton*, in what is known as the "burnt ground," north-west of the camp.

The *Anarchist*, title, Crown grant, is situated about one mile west of the camp, in the granite formation. A well-defined ledge has been opened by two shafts, 60 feet and 50 feet, carrying pyrites, zinc-blende and galena, with good gold values. The *Dynamite* adjoining, and an extension, has had only assessment work done.

#### THE WEST FORK OF KETTLE RIVER.

From information furnished by Mr. W. Thompson.

Little work has been done as yet on the numerous properties in this section, as the prospectors who own the claims, as a rule, have a number of properties each, and the yearly assessment work to be done on each claim prevents them, from a lack of funds, from doing more than the work necessary to hold the ground. On the following claims, a considerable amount of development work has been done:—

The ledge on this property has been traced, by a series of open cuts, Carmi for the whole length of the claim, 1,500 feet; thence across the *Butcher Boy* Mineral Claim. another 1,500 feet, and those having extensions beyond this claim report that the ledge is visible on their ground. This ledge has a north-west and south-east trend, clearly defined walls with gouge on both sides, and has for a gangue quartz containing copper and iron pyrites, galena and zinc blende. This is a good concentrating ore, and its proximity to the West Fork of Kettle River, which is distant about 100 yards, will render it a valuable property. The dip of the ledge is almost vertical, and on it has been sunk a shaft about 15 feet deep, and a tunnel driven in on the ledge (at the base of a terrace 40 feet high) to a distance of 15 feet, in both instances in good ore.

This is a very promising property situated on Beaver Creek, a tributary King Solomon of the West Fork of Kettle River, and has three well-defined, parallel Mineral Claim. ledges of quartz, heavily mineralized, of an aggregate width of 12 feet, with clearly-defined walls. The veins have been traced across the claim and on to adjoining ground. The ore on this claim is concentrating, and is of somewhat similar character to that of the *Carmi*. About \$1,500 worth of development work has been done, consisting of a tunnel 40 feet long, a shaft 40 feet deep, a second shaft 15 feet deep, and several open cuts and trenches.

The *Bella* is another claim of considerable promise—a silver-lead proposition. The owners are developing this claim by continuous work, following the ledge down a steep gully, intending to tunnel at the depth of about 500 feet. Good buildings have been erected, and work is being vigorously prosecuted.

Across the gulch, about half a mile, is situated the *Iron Horse* and *Atlantic Cable* groups of five claims, where an enormous outcropping of quartz, from 20 to 60 feet wide, carrying arsenical iron with high gold values, can be traced on three of the claims, the *Iron Horse*, *Yellow Rose*, and the *Atlantic Cable*. The owners of these properties are driving a tunnel to cut the ledge at a depth of 150 feet, and expect to strike it with 50 feet of work. This last described group of claims is a fair sample of numerous claims, such as the *Silver Dollar*, *O. K.*, *Highland Mary*, *Highland Chief*, *Sunrise*, 16 to 1, *Mountain View*, *Maple Leaf*, and *Hill Top* all of which carry gold values in ledges of quartz.

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**OFFICIAL STATISTICS—OSOYOOS DIVISION (to 30th November, 1898).**

Number of Free Miners' Certificates.....	344
"    location records (mineral).....	496
"    placer records or re-records.....	5
"    certificates of work.....	351
"    certificates of improvements.....	28
"    conveyances and agreements.....	210
"    abandonments.....	22
"    permissions to re-locate.....	4
"    filings.....	97

**Abstract of revenue for eleven months :—**

Free Miner's Certificates.....	\$2,806 00
Mining Receipts, General.....	3,023 45
Total.....	\$5,829 45

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**KETTLE RIVER MINING DIVISION.****REPORT BY MR. W. G. McMynn, Mining Recorder.**

I have the honour to submit the statistics, taken from the records in this office, during the first eleven months of this year, accompanied by references to some of the principal mineral claims in the Division, which were kindly furnished to me by the Boundary Creek special correspondent of the Vancouver "News-Advertiser," which have, I believe, been very carefully compiled.

In regard to the development work, machinery, or values of the different mineral claims in this Division, my personal knowledge is very limited, as I have not had either the time or opportunity this year of seeing many of the claims, but I know a few of them, at least, ought to be fully mentioned in this annual report to you. For this reason, I feel very much indebted for the privilege of submitting portions of the aforementioned special correspondent's summary of progress for 1898, and also to Mr. Frederic Keffer, M.E., of Anaconda, for an article kindly contributed for publication, and now attach them hereto.

A great many of the new locations made this year are situate on Kettle River, north of the mouth of Rock Creek. The ore-bodies in this locality, especially around Deer Creek, Canyon Creek, and Cedar Creek, are reported to be very large, but as yet scarcely prospected. In some cases, a few feet in depth has been sunk, and that with good results, but this District may well be termed undeveloped. The surface values so far obtained are also reported to compare very favourably with the surface assays first obtained on Boundary Creek, consequently this locality may, in a short time, be equally as important as Boundary Creek.

The distance from Rock Creek to Deer Creek is about 49 miles. The river valley has, at least, an average width of one mile. In some portions of it, good agricultural land may yet be pre-empted; on other portions, there is a large amount of timber. For eight miles north of Rock Creek, *i. e.*, to the mouth of the West Fork of Kettle River, the agricultural land is nearly all located. A waggon road has also been built to this point, and now a bridge over the West Fork is very much needed, especially during the winter and high water seasons. A good waggon road can be built from the West Fork to Deer Creek at a cost of about \$4,500,

## OFFICE STATISTICS—KETTLE RIVER DIVISION (to 30th November, 1898).

Number of Free Miners' Certificates .....	653
"    Location Records .....	563
"    Certificates of Work .....	528
"    Certificates of Improvement .....	40
"    Conveyances and Agreements .....	361
"    Abandonments .....	55
"    Permissions to Re-locate .....	3
"    Water Grants .....	5

## Abstract of Revenue for eleven months :—

Free Miners' Certificates .....	\$4,522 10
Mining Receipts .....	3,826 00
Total .....	\$8348 10

For the following references to the claims of this Division I am indebted to the special correspondent of the "News-Advertiser."

## DEADWOOD CAMP.

"Without complete records available it is not possible to epitomize the work done and the results achieved in this District during the year 1898, yet a fair review is practicable from the data at hand. For adequacy of equipment and systematic thoroughness of development work carried out, the *Mother Lode*, in Deadwood Camp, may, without reflection upon excellent work done on other claims, be placed first. This property was recorded on May 28th, 1891, and was bonded for \$14,000 in June, 1896, by Col. John Weir, of New York, who, with several associates, organised a corporation named the Boundary Mines Company, of New York. The surface showings on the *Mother Lode* may rightly be described as enormous. It is one of the most striking in the district, the outcroppings of the large ore-body standing out prominently for 1,000 feet along the hill in which it occurs, and rising to a height of nearly 300 feet. The lode has a strike approximately north 25° east, and it lies between lime and porphyry formations. Its width is naturally not so well defined on the surface as in the tunnel below, but it appears to cover a distance of nearly 200 feet. The locators of the claim did a deal of surface prospecting, and the Boundary Mines Company ran a cross-cut tunnel 245 feet into the hill, commencing at a point about 100 feet above the level of its base. For 42 feet the tunnel was through limestone, and for the remaining 203 feet to the hanging-wall, through rock mineralised with iron and copper, but in the main of very low grade. Allowing for the diagonal course of the tunnel, it is estimated that this ore-body is 185 feet in width. Then a winze was sunk 100 feet, commencing at a point 152 feet in from the mouth of the tunnel. From the bottom of this winze a cross-cut was run to the hanging-wall, and this disclosed that the ore had much increased in value in that additional depth. Next the Company bonded for \$7,000 the adjoining *Primrose Fraction*, and a long cross-cut was then run from a prospecting shaft on this claim, at a depth of about 50 feet below the lower cross-cut on the *Mother Lode*. Whilst the work was in progress on the *Primrose*, early in 1898, a larger company, named the British Columbia Copper Company, Ltd., was organised in New York, with a capital of \$1,000,000, in 200,000 shares at \$5, 30,000 shares being treasury stock, which was at once taken up by men of ample means, so that the new company started with \$150,000 available for equipment and development. A plant was at once purchased and permanent mining work was entered upon. The plant which



is now in operation on the claim, consists of two stationary boilers, each 60 h.p. ; a Lidgerwood hoist with 30-inch drum ; a Northey-Cameron pump, 10 x 5 x 13, for pumping water up 300 feet from the creek ; a Knowles pump, 7 x 10 cylinder, for use in the shaft ; and Ingersoll-Sargeant air compressor, to drive 10 machine drills, and a full complement of drills, cable, fittings, pipes, etc. An electric light plant, consisting of an Edison dynamo and a Lively engine, these having a capacity of fifty 16 c.p. lights, was also put in, provision being made to fire the blasts by electricity as well as to light the mine workings and buildings. The site chosen for the main working shaft is on the opposite side of the hill to the mouth of the tunnel already mentioned. The mouth of the shaft is at an elevation of about 25 feet above the level of the lower cross-cut, so that when the 200-foot level is reached, which will be early in January, a depth of about 175 feet below the lower level of the old workings will have been gained. Sinking will be stopped for the time at the 200-foot level, and the big lode will be extensively prospected at that depth by cross-cuts and drifts. Although the shaft has been sunk independently of whether it was in ore or not, some bunches of nice ore have been met with, and at the time of writing the bottom of the shaft is entirely in ore of good grade. The shaft is vertical and has two compartments, each four feet six inches by five feet in the clear, with provision made for adding a third compartment of similar size, should the development of the property require later such additional accommodation. The timbers are twelve inches square, and the lagging 2 x 12. All ladders are inclined with a platform every fifteen feet, so due regard is had here to the safety of the miners, which is little provided for in most cases in the District. The property is in charge of Mr. Frederic Keffer, M. E., who has his office, laboratory, and residence at Anaconda, about three miles distant. With a big lode to prospect, and having the heaviest mining plant in the district, backed by ample capital to pay for development work, to do it with, the outlook for the British Columbia Copper Company, and consequently for Deadwood Camp, is decidedly encouraging.

"Among other properties in Deadwood Camp upon which more or less development work has been done during the year are the *Buckhorn*, *Marguerite*, *Morrison*, *Sunset*, and *D. A.*, and *G. A. R.*, the last two claims being owned by the Boundary Creek Mining and Milling Company, of Greenwood. The tunnel on the *Sunset* was extended to about 400 feet, and the shaft deepened, but a suspension of work was ordered from Montreal before the body of pay ore, believed to be not far off, was reached. The big surface showing on the *Morrison* was lately further prospected and some nice ore was met with in a prospect shaft, but developments on this promising claim do not yet call for particular notice. A small steam plant, removed from the *Athelstan* claim, in Wellington Camp, is now on the ground, but it has not yet been set up. Work on the *D. A.* and *G. A. R.* claims has been in disturbed ground, so a diamond drill is being obtained to try whether the formation is less broken up at greater depth. The *Anaconda Group*, from which much was expected last year, remains undeveloped.

#### GREENWOOD CAMP.

"Greenwood Camp during 1898, has attracted more attention and seen more actual work in progress, in the aggregate, than any other camp in the district.

The *Old Ironsides* and *Knob Hill*, which are adjoining claims, owned Old Ironsides, nominally by different companies, but controlled by the same leading stock- holders, are developing very satisfactorily. The Old Ironsides Mining Co., of Knob Hill. Montreal, is capitalized at \$1,000,000 in \$1 shares, 300,000 being treasury stock. Its property is equipped with a 60 h.p. boiler, a 6 by 8½ hoist, three pumps, a No. 5 Cameron, a No. 7 Knowles, and a No. 8 Knowles duplex, and a 10-drill air compressor, which also supplies drilling power for the *Knob Hill*. During the year the *Old Ironsides* shaft has

been deepened to 200 feet, at which level a 273-foot cross-cut has been run, passing through 240 feet of ledge matter, of which about 83 feet is stated to be pay ore. The work now in hand is an upraise of nearly 160 feet, to connect with a prospect shaft about 50 feet in depth, to ensure better ventilation. It is claimed that much of the *Old Ironsides* ore averages \$25 in all values. The ore dump contains about 2,000 tons. The *Knob Hill* has been opened up by a cross-cut tunnel which, after passing through ore the whole distance at 400 feet ran into country rock, whether an intrusive 'horse,' or a wall has not yet been determined. The tunnel has been run diagonally, but it is estimated that the right angle distance across the ore-body is about 240 feet. This tunnel gives a depth of 140 feet. An upraise will be made to the surface for air, and then a station will be put in the cross-cut for a hoist, preparatory to sinking. A similar average value to that named for the *Old Ironsides* is claimed for a large proportion of the *Knob Hill* ore, of which there are, approximately, 7,000 tons on the dump. The *Knob Hill* Gold Mining Company is capitalised at \$1,500,000 in one dollar shares, 700,000 being treasury stock.

Early in the year, by the purchase of the several interests in the *Brooklyn*, *Boundary Creek* mineral claims of Messrs. Farrell and Migeon, of Butte, *Stemwinder*. Mont., Messrs. Mackenzie, Mann, and Holt, of Toronto, and others associated with them, secured a large interest in a number of claims, among them being the *Stemwinder*, *Montezuma*, *Phoenix*, and *Standard*, in Greenwood Camp. Later they obtained control of the *Brooklyn*, which adjoins the *Stemwinder*. They have since done a deal of work on these two last-named claims. On the *Stemwinder* they deepened No. 2 vertical shaft from 50 feet to 100 feet, at which latter depth they cross-cut 75 feet. After cutting the ore they went down 25 feet in it. The ore-body is said to be chalcopryite with a gangue of lime and silica. It varies from 12 feet to 15 feet in width, and is reported to run from \$30 to \$40 in gold, 5 or 6 per cent. of copper, and a few ounces of silver. A tunnel, commenced some 300 feet lower down the hillside and run in 50 feet, cross-cut the vein at a depth of 60 feet from the surface. No. 3 shaft is now being sunk on the incline. It will connect, at 100 feet, with the 25-foot winze mentioned above. It is intended to put in a steam plant when this connection shall have been made. Near by on the *Brooklyn*, two 30 h.p. boilers, and a hoist have lately been installed. The incline shaft has been sunk from 25 feet to 100 feet, and now the work of deepening to the 200-foot level is in progress. The shaft is going down on the foot-wall in ore of a similar character to that on the *Stemwinder*, and said to run about \$23 in gold, 5 or 6 per cent. in copper, and a little silver. The vein has not yet been cross-cut below ground, but on the surface it has an apparent width of about 70 feet.

"The *Snowshoe*, also in Greenwood Camp, bonded early in the year for \$65,000 by the representatives of a British syndicate, has had a considerable amount of development work done on it, but details are not known to the writer. It is stated that the incline shaft was sunk to a depth of 185 feet, and that nearly 200 feet of drifting was done, with what result has not been made public. It is understood, though, that the promise given by the excellent surface indications has been well maintained below ground.

A contract to drive a 300-foot tunnel on the *Rawhide* will, it is expected, be about half completed by the New Year. The object of this tunnel is to cross-cut the vein at a depth of about 250 feet. The ore contains hematite, and chalcopryite with a quartz gangue. Open cuts show the surface width of the ore to be from 60 to 70 feet.

"Among other claims in Greenwood Camp worthy of mention are the *Idaho*, *Red Rock*, *Four-Ace*, *Aetna*, *Fourth of July*, *Victoria*, *Pheasant*, *Gold Drop*, and *Monarch*.

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SUMMIT CAMP.

“The Mackenzie & Mann Syndicate, which has a considerable interest in Summit Camp, is reported as about to resume work on the *Emma*, which Mineral Claim. lies between the *Oro Denero* and the *Jumbo*. The lead has been traced from the *Oro Denero* northward through the *Emma* and *Jumbo*, and thence into the *Minnie Moor*. The vein is described as being solid, 35 feet in width on the *Emma*, where there is a vertical shaft 100 feet in depth, with a 15-foot cross-cut at the 50-foot level. The ore is magnetic, with copper, and assays taken whilst sinking returned \$4.50 in gold, 8 ounces silver, and 8 per cent. copper.

“There are other promising claims in Summit Camp, and among them the *Summit* and the *Cordick* (the latter owned by the Adams B. C. Company, of London) have recently had additional work done on them.

## LONG LAKE CAMP.

“Work has been resumed on the *Jewel*, in Long Lake Camp, lately acquired by the Jewel Development Syndicate, which was organised a short time ago in London, England, by Mr. Gilbert Mahon, of Vancouver. The *Jewel* had an incline shaft sunk about 170 feet prior to the suspension of work, which took place early in 1898. About 220 feet of drifting at the 120-foot level was also done at the same time. The first steam mining plant brought into the district was installed at the *Jewel* early in 1897. It consisted of a 15 h.p. boiler, 6 h.p. hoist, and a steam pump. The *Jewel* last year enjoyed the further distinction of having the best timbered and, from the miner's point of view, safest shaft in the district. Its quartz vein has been irregular in value, although maintaining well its size. It is anticipated that, under the new auspices, more settled country will be reached, and better general values be obtained.

“The *Anchor* and *Enterprise*, and the *Lakeside*, thought to be no the extension of the *Jewel* lead, also promise to well repay the cost of extensive prospecting. The *North Star* is one among several other Long Lake claims likely to come into notice.

## KIMBERLY CAMP.

“Kimberly Camp has been further prospected this year, and some good finds have been reported, but development work has been too limited to determine the value of its big showings at a depth.

## PROVIDENCE CAMP.

“A shipment of ore from the *Strathmore*, formerly the *San Bernard*, in Providence Camp, yielded returns that, when compared with the assay values from numerous carefully-taken samples as work progressed, were so very disappointing that intended further shipments were not made. It has lately been announced that a commencement will shortly be made to run a 300-foot tunnel on the *Combination*, also in Providence Camp.

## SKYLARK CAMP.

“Skylark Camp has not made much progress during the year now closing. A two-compartment, vertical shaft was sunk 100 feet on the *Last Chance* without encountering the lead, so work was stopped for the time. The *Lake* was bonded and prospected by a New York investor, but without encouraging results. Work was also done on other claims, but no discovery of any importance was made.

## SMITH'S CAMP.

"In Smith's Camp, work on the *Ruby* was discontinued, the water being too heavy to admit of satisfactory progress being made. The tunnel on the 4-foot quartz lead occurring on the *Great Hesper* is now in 60 feet. Values here are chiefly in silver, with a little gold. The *Golconda*, with a lead opened by surface cuts over a distance of 400 feet, and a 60-foot shaft sunk in ore, has been further prospected by a tunnel, which cuts the vein at 50 feet in. A drift run 17 feet showed 4 to 5 feet of quartz, carrying arsenical and iron pyrites. Nothing has been done for some time past on the *Boundary Falls*, on which, it is claimed, occurs a fine body of free-milling quartz, carrying paying gold values.

"The *Republic Group*, also in Smith's Camp, was under bond early in the year, and a lot of work was done on the *Non Such*. The most important part of this work was the extension of the upper tunnel from 140 feet to 300 feet, and the making from this of an upraise 67 feet to the surface. The tunnel was run on the vein, which, though irregular, showed a width of about 3 feet 6 inches in the face of the tunnel. The ore is iron and copper pyrites in white quartz, and it is said to return average assay values of \$18 to \$20. The other claims in this group, *Republic*, *Last Chance*, and *Hidden Treasure*, are practically as they were at the close of 1897.

## COPPER CAMP.

"Copper Camp is once again claiming notice. In August and September last, a deposit of blue and green carbonates of copper was opened up on the *King Solomon*, owned by Mr. D. C. Corbin and other Spokane investors. This ore showed native copper freely, and, being very pretty specimen ore, was much talked of. The deposit was passed through, and lately, operations were temporarily suspended, pending the receipt of a steam hoist to expedite working. The *Copper Mine*, also known as the *Big Copper*, may soon be further tested, with the object of determining whether its big deposit of copper ore is only a blanket or a continuous lead.

"Several very likely-looking prospects have been opened up in West Copper Camp, and these will shortly be further developed.

## GRAHAM'S CAMP.

"In Graham's Camp, a 250-foot tunnel was run on the *Bruce*, and similar work has been done on the *Potter-Palmer Group*, but so far without disclosing the presence of the looked-for large bodies of copper ore, as indicated by big surface showings.

## CENTRAL CAMP.

"About \$2,000 worth of work has been done on the *Norfolk*, in Central Camp, by the London and B. C. Goldfields, Ltd., and, as a result, some nice showings of ore have been exposed. Twenty or thirty tons of good grade ore were taken from the 50-foot level of the *No. 7* in doing work for the year. It seems a pity that this valuable claim, and others in the vicinity, remain practically inoperative for lack of waggon road connection, when it is known that they contain much marketable ore.

"The *City of Paris* is the only claim in Central Camp at present displaying any activity. This and the adjoining *Lincoln* claim are being operated by the City of Paris Gold Mining Company, a Spokane organisation capitalised at \$1,200,000. A 10-drill air compressor was recently installed on the property. A cross-cut tunnel is being run, to cut, at a depth of about 300 feet, the two leads known respectively as the *City of Paris* and *Lincoln* leads. This tunnel is now in 500 feet, and will, it is expected, shortly intersect the *City of Paris* lead. The *Lincoln* vein is estimated

to be about 100 feet farther ahead. Should these leads be cut, and prove equal to expectations, a 1,600-foot tunnel will be run at a lower level, to cut them at 700 feet in depth. Everything about the City of Paris Camp—work, plant, and buildings—denotes that the Company looks forward to continuous development. It is most earnestly hoped that its most sanguine expectations will be realised.

"In the foregoing summary of the camps of Boundary Creek District it is inevitable that some deserving claims should have been omitted. No attempt has been made to review every claim, of either proved or prospective merit. It must, however, be evident to all who read the foregoing details, that among so very many mineral claims apparently worthy of mention, it will indeed be strange if at least a few of them do not develop into permanent mines.

#### BOUNDARY CREEK DISTRICT.

**Conformation and Climate.** "Boundary Creek district is the most important section of the southern portion of Kettle River Mining Division. It embraces a number of mining camps situated to the east and west of Boundary Creek which, flowing in a southerly direction, enters Kettle River at Midway. The district is generally mountainous, though few of its mountains exceed 5,000 feet in height. Most of them are easily accessible to their summits. They are covered with forest trees, and their slopes generally afford good pasture. Its valleys and some of its foot-hills, especially in the immediate vicinity of Midway, are adapted for agricultural purposes, though comparatively little of the land has yet been cultivated. The snow lies on the ground during only three to four months of the year, and the winters, as well as the summers, are usually mild. The official records, from data obtained at Midway, show the mean temperature to have been last year 42.8 degrees, and the rainfall for the same period, 13.3 inches.

**Geology and Ores.** "The geological features of the district are described by Mr. S.S. Fowler, A. B., E. M., of Nelson, as being 'varied and interesting.' In the report of the Provincial Minister of Mines for 1896, at pages 580-1, may be found a brief summary of the geology of Boundary Creek, contributed by Mr. Fowler.

"The following reference to the geology and ores of the district was made by Messrs. George A. Guess, M. A., and J. C. Haas, M. E., in a pamphlet compiled by them for distribution: 'Altered sedimentary and metamorphic rocks, occurring with numerous eruptive "porphyries" and "diorites," flank the basal granites which occupy the upper portion of the creek. The ores of the district \* \* \* \* \* may be conveniently divided into: I. Copper ores. II. Heavy sulphide ores. III. Concentrating quartz ores. IV. Free-milling ores. V. High grade shipping ores.'

**Early History.** "It is hardly possible to now obtain an authentic history of mineral discoveries in this district. Accounts vary very much, but there appears to be no doubt that placer mining was successfully carried on nearly 30 years ago along Boundary Creek, the workings extending a mile or two up from its junction with Kettle River. It seems, though, that it was not till about 1884 that the first quartz claim was staked. This was located near Boundary Falls. Other discoveries were afterwards made in what is now known as Smith's Camp. Copper Camp attracted the notice of pioneer prospectors in 1886, these men having first visited Rock Creek and what is now known as Camp McKinney, and then explored the mountains lying north-east of those places. As the years passed, locations became numerous and were spread over an increasingly wide area. Intermittent attempts were made to work some of the claims, but under so many difficulties little effective development was practicable in such an isolated locality. So prospectors did

little more than assessment work, holding only the best claims, in the hope that the country would eventually be opened up by roads and railways. Slowly the district came into notice, until four or five years ago it attracted the attention of several enterprising Americans, who, realising that the prospective value was great, acquired some of the best of the mineral claims. In one or two instances shipments of ore were made by the new holders, and notwithstanding that the charge for hauling to Marcus, which was then the only accessible railway point, was \$30 per ton, they realised a profit on their venture. Since that time claims have been purchased by numbers of outsiders, the majority being American citizens resident at Spokane or Butte. Latterly, Eastern Canadian and English syndicates and companies have acquired Boundary Creek mining properties, until at last parts of the district are being extensively and systematically prospected, and the urgently needed transportation facilities will soon be provided by the Canadian Pacific Railway Company.

**The Mining  
Camps.**

"The several mining camps of the Boundary Creek District, with the general character of their ores, and their approximate distance and direction from Midway are as follows:—

"1. Graham's Camp.—Big surface showings of copper ore assaying well in gold and silver; distance, about two miles west.

"2. Smith's Camp.—Veins one foot to eight feet wide; ores carry gold and silver in silicious gangue; assays from \$3 to \$100 in gold, and from ten to several hundred ounces of silver; distance, about five miles north.

"3. Copper Camp.—Large bodies of cuprite and chalcocite, carrying some gold and silver, and assaying from 6 to 20 per cent. copper; distance, about 14 miles north-west.

"4. Deadwood Camp.—Large bodies of copper-gold and iron-gold ores; assays from \$1 to \$30 gold, and from 2 to 20 per cent. copper; distance, 10 miles north.

"5. Kimberley Camp.—Big quartz leads and iron cappings, with ores carrying gold and silver; distance, 16 miles north.

"6. Long Lake Camp.—Veins one foot to eight feet wide; silver-gold ores with some copper and silicious gangue; assays up to \$500 in gold and 150 ounces in silver; distance, about 16 miles north-east.

"7. Summit Camp.—Ore bodies 10 to 50 feet wide; copper pyrites, carrying gold and silver; assays \$3 to \$10 in gold, up to 200 ounces of silver, and 3 to 20 per cent. copper; distance, about 17 miles north-east.

"8. Wellington Camp.—Ore bodies from 3 to 20 feet wide; copper-iron pyrites and pyrrhotite in a silicious gangue; assays up to \$800 in gold; also some silver claims in this camp; distance, about 16 miles north-east.

"9. Greenwood Camp.—Ore bodies from 10 to 300 feet wide; copper pyrites carrying gold; assays from \$3 to \$100 in gold and 3 to 15 per cent. of copper, a considerable proportion carrying from \$10 to \$30 in gold and 4 to 8 per cent. copper; distance about 13 miles north-east.

"10. Providence Camp.—Silver-gold ores; veins from 6 inches to 4 feet wide; assays from \$5 to \$100 in gold and from 50 to 500 ounces in silver; also copper-gold ores; distance, about 9 miles north.

"11. Skylark Camp.—Silver-gold and copper-gold ores; veins of former 1 foot to 3 feet wide, assaying \$5 to \$50 in gold and 50 to 800 ounces silver; veins of latter are larger and give \$1 to \$6 in gold and 3 to 20 per cent. copper; distance about 9 miles north-east.

"12. Central Camp (including Atwood's, Douglas' and White's Camps).—Veins 2 to 12 feet wide; ores copper, gold and silver-copper-gold; assays from \$3 to \$20 in gold, 5 to 200

ounces in silver; veins of latter are larger and give \$1 to \$6 in gold and 3 to 10 per cent. of copper; distance, about 8 miles east.

"There are also some promising claims with copper-gold ores at Pass Creek, about 20 miles north-east; several very good prospects having copper-gold ores at West Copper Camp; distance, about 12 miles north; and others on Wallace Creek which joins Boundary Creek about 13 miles above Midway, and on Myers Creek which enters the Kettle River four miles above Midway.

#### ORES OF BOUNDARY CREEK.

"The following is from an article on the ores of Boundary Creek, contributed recently for publication by Mr. Frederick Keffer, M. E., of Anaconda, Boundary Creek, manager for the British Columbia Copper Company, Limited, which Company owns the *Mother Lode* group of claims situated in Deadwood Camp:

"So far as development work in the various camps now indicates, the following general conclusions would seem to be warranted:—

"(a.) Boundary Creek will be a copper and gold camp, with copper as the main product. There will, of course, be considerable silver produced, but, taken as a whole, its position in the camp will be secondary.

"(b.) To a large extent, in some properties perhaps entirely so, the gold will pay the mining and smelting charges, leaving the copper partly or wholly net profit.

"(c.) As a whole the camp will be a low grade one, a camp possessing ore-bodies of unusual extent, but in the main of low grade. Various estimates have been made of the average tenor of the ore. In view of the limited amount of development so far accomplished, any estimate is hazardous, but in the writer's opinion the mean value of the smelting ores of Boundary Creek, as sorted from the mines, will not exceed \$20 per ton in gold and copper, and may fall below this figure to some extent. This may seem to some enthusiastic people a low estimate, but it must be remembered that the difference between the assays made whilst development work is in progress, and those of thousands of tons of ore sampled in mechanical and unbiased samples at the mills, is certain to be great, and that not in favour of the mine.

"(d.) Although some of our companies have been at work on their properties for two or three years, still it is true that as a whole the development so far done is comparatively slight, especially when the great size of the ore-bodies is taken into consideration. Half a million dollars would be quite a liberal estimate of the money spent to date in development. This sum has, in other localities, often been expended in the development of a single mine. Here, scattered among many claims of promise, the result in individual cases is bound to be small.

"(e.) As a direct result of the above, it may be said with perfect truth that as yet there is not a *mine* in the District, for a property cannot be designated a *mine* until there is sufficient ore actually in sight to warrant the title. And by the expression 'ore in sight,' it is not meant that product of guess work found by sinking a shaft a hundred feet or so and drifting a bit, and then multiplying the ore seen therein by the size of the whole claim, and by a depth limited only by the modesty of the multiplier, but what is meant is pay ore actually blocked out by drifts, cross-cuts, and winzes, ready to be stoped, and in such shape as to admit of fairly accurate measurement. Until a company has such a property it has no mine, although it may have a claim of exceeding great promise.

"That the District has a number of properties of this exceeding great promise, nobody familiar with the camp will deny. And it is this fact that warrants all that has so far been done, and which causes us to believe that Boundary Creek will, in due season, rank among the great mining camps of the west."

## GRAND FORKS MINING DIVISION.

REPORT BY MR. S. R. ALMOND, MINING RECORDER.

Herewith I have the honour to forward report of work passed through this office since the 1st day of December, 1897, to the first day of the same month, 1898. In your circular you require a statement of progress made in each camp, and on each claim in such camp. I do not see how this can be done, unless through personally visiting the camps; certainly the information is not forthcoming from the different mine-owners, for last year I got them, as much as possible, to give me reliable information, and that information not having been published, the matter seems to have been laid at my door. However, I can say that all the camps are doing considerably more work this year than last, and to some of the mines large quantities of heavy machinery have been taken. One or two new camps have opened up this season on the Forks of the North Fork of Kettle River, and in the Christina Lake country.

STATISTICS FROM 1ST DECEMBER 1897, TO 30TH NOVEMBER, 1898.

No. of Free Miners' Certificates .....	561
Location Records .....	860
Certificates of Work .....	791
Certificates of Improvements .....	17
Conveyances and Agreements .....	466
Permissions to Relocate .....	4
Abandonments .....	75
Filings .....	352

### ABSTRACT OF REVENUE FOR TWELVE MONTHS.

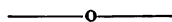
Free Miners' Certificates .....	\$3,687 00
Mining Receipts .....	6,196 10
Total .....	<u>\$9,883 10</u>

### HYDRAULIC LEASES.

A Company composed of Messrs. Hodgson, Barrett, and Ferguson obtained three leases of half a mile each, of abandoned placer ground on Boundary Creek, for hydraulic purposes, but, as far as I can learn, have not as yet taken any steps to open up these claims.

The following is a statement of the number of mineral claims for which Crown grants have been obtained, in the different mining divisions during the year, viz:—

Osoyoos Mining Division .....	36
Kettle River " .....	39
Grand Forks " .....	7—total, 82.



## VERNON MINING DIVISION.

REPORT BY L. NORRIS, GOLD COMMISSIONER.

Besides the various claims referred to in last year's report, other claims of equally great promise have been located. The *Grand Times* and *Hidden Treasure*, on 6-Mile Creek, contain a fine body of free-milling gold quartz. These claims have been recently purchased by Mr. G. W. Howe, of San Francisco, who is running a tunnel on the vein. The tunnel is now in 60 feet, and the work still going on.



The *Klondyke*, on White Man's Creek; *Polar Star*, on Short's Creek; and the *Hic Jacet*, seven miles south-west of Vernon, are all very promising claims, but little development work, however, has been done on them. It is to be regretted that development work was not prosecuted more vigorously on some of these claims, as the surface showings are very promising.

Arrangements have been made by the Camp Hewitt Mining and Development Company whereby development work on an extensive scale will be carried on this winter on their various claims near Camp Hewitt, including the *Gladstone*, *Lake View*, and *Dandy*.

The Canadian-American Mining and Development Company, of Peachland, has, within the last 18 months, located 25 claims in the vicinity of Glen Robinson, situated about 15 miles west of Peachland. The formation is chiefly granite and porphyry, and several of the ledges show croppings over 100 feet wide, and are traceable for miles. This Company has this year expended over \$10,000 in developing these claims. On the *Alma Mater Group*, north of Glen Robinson, which includes the *Alma Mater*, *Golden Crown*, *Mountain Queen*, *Shiloh*, *Arthur R*, *Golden Tarry*, and *Rose Bud*, three tunnels have been driven, 218 feet, 72 feet, and 115 feet, respectively, and three shafts, 14 feet, 10 feet, and 13 feet, respectively.

On the *Silver King Group*, which includes the *Silver King*, *Mary F*, *Canadian King*, *Julia Anna*, *Lily R*, and *Doctor L*, they have sunk one shaft 15 feet, driven one tunnel 110 feet, and cross-cut 20 feet. They have also, on the main ledge on this group, a winze down 25 feet and cross-cut 40 feet. The ores are mostly free-milling. A tunnel is now being driven to cross-cut the vein on the *Silver Star Group*, from which the higher assays were obtained. On its course it encountered a 15-foot vein of gray and white quartz, bearing values in free gold, and on this ledge the winze is now down 25 feet.

Nine miles west of Glen Robinson, on Bald Mountain, is the *Kathleen Group*. *Group* of claims, owned by this company. These claims are all staked on a strong ledge of rose quartz, lying between walls of granite and porphyry. The ledge is upwards of 50 feet wide, and can be traced for miles. Work was pushed vigorously last summer, and will be resumed next spring. The tunnel driven to cross-cut a fine surface showing of quartz, distant about 300 feet, is now in 220 feet. Assays (without depth) show values of \$4 and \$5.30.

Nine miles north of Glen Robinson lies the *Mineral Hill Group*, also owned by the same Company. These claims are all base in character. The formation is of diorite and slate, with contacts of granite and lime. The ledge is so clearly defined that the seven claims lie end to end. No development work worthy of mention has been done on them, owing to the want of transportation facilities. No ore has been shipped from any of these camps, but about 300 tons lie on the *Kathleen*, *Alma Mater*, and *Silver King* dumps ready for milling.

The following statistics, prepared by Mr. J. C. Tunstall, Mining Recorder at Vernon, show the mining transactions for the year:—

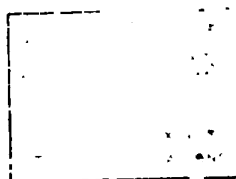
Free Miners' Certificates .....	255
Claims Recorded .....	84
Certificates of Work .....	128
Transfers .....	45
Certificate of Improvements .....	1



**“VAN ANDA” SHAFT, TEXADA ISLAND.**



**MAIN SHAFT, UNDERGROUND, “SILVER KING” MINE,  
NELSON.**



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## VANCOUVER ISLAND AND COAST.

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### ALBERNI DISTRICT.

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#### ALBERNI MINING DIVISION.

REPORT BY THOS. FLETCHER, GOLD COMMISSIONER.

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#### ALBERNI CANAL.

The Nahmint Mining Company's group, consisting of four full-sized mineral claims and three fractions, is situated on the west side of the Alberni Canal, half a mile south of Nahmint Bay and about 15 miles from the Town of Alberni. Active development work was commenced on these claims last spring and was carried on under the supervision of Mr. G. H. Hayes, from whom I have the following information.

The Nahmint Mining Company was organised in 1898, with a capital of \$100,000, in one-dollar shares. Development consists of 600 feet of tunnel and 150 feet of shaft work. The lower tunnel cuts the vein at a depth of 265 feet, at a point where the vein is 28 feet wide, carrying values in copper, gold, and silver. Shipments in 1898 consisted of about 120 tons of ore. Improvements at the mine comprise boarding-house to accommodate 30 men, two ore sheds, and a road from wharf to mine, about two miles long. Improvements at the water-side include a wharf, warehouse, office, manager's residence, store-room, boarding-house and stable, together with other smaller buildings.

The *Raven* and *Eagle* mineral claims, owned by H. S. Law and others, are situated  $2\frac{1}{2}$  miles from the Town of Alberni, on the west bank of Alberni Canal. There are three veins on the property, outcropping at deep water and running back into the mountain. Values are in copper and gold.

*Union Jack Group*.—The *Union Jack Group*, owned by H. S. Law and others, is situated near lot 77, Alberni Canal. There are three veins on the property, the values being in copper.

#### ANDERSON LAKE, UCHUCKLESIT HARBOUR.

Composed of six claims owned by the Forfarshire Mines Company.

*Mountain Treasure Group*. Situated about  $1\frac{1}{2}$  miles from the mouth of the lake, on the west side. Three of the claims, the *Mountain Treasure*, *Pacific* and *Pheasant*, have very extensive showings of sulphide copper ore and pyrrhotite. The property, under the management of Mr. J. Cameron, has been thoroughly prospected during the past summer, by open cuts and tunnels, proving the existence of an extensive ore zone containing large chutes of ore. Several bodies of good grade ore have been exposed on this property by the past season's work.

Adjoining the Forfarshire mines is the *Marmot Group* of six claims, owned by Messrs. Pemberton and Luxton. This property has fine surface showings, which on the *Marmot* claim has been stripped in various places with good results.

Opposite the *Marmot Group*, on the east side of Anderson Lake, is the *Lake Shore Group* of three claims, owned by Messrs. McKinnon, Shafer, and Jackson, who are now developing a very strong showing of pyrrhotite ore close to the water front. The values of the body of ore at the present stage of development are low, but increasing as depth is gained.

Adjoining the *Lake Shore Group* is the *Florence Group* of four claims, owned by Messrs. Young, Johnson, Langley, and Avery. Development work is being done on a lead of high grade copper ore running through the property.

#### MINERAL HILL.

Work on this mine was carried on during the past season. An 8-stamp mill was erected on the property, with a capacity of ten tons per day. Two clean-ups have been made and both were very favourable. The work done has shown up several veins carrying free gold. Several new discoveries were made on the property the past season.

#### HEAD OF CHINA CREEK.

Work on the *Golden Eagle* mine, consisting of tunnels, has been steadily carried on during the whole year.

#### GRANITE CREEK.

Near the head of this creek a very rich strike was made last June by Messrs. Wilson, Wilson, and White, on the mineral claims *W. W. W. Nos. 1 and 2*. The ledge is 20 inches wide, with gold freely distributed in the white quartz. Further development will have to be done to prove the continuance of the vein.

In addition to the above properties a number of claims have been recorded in the Division a large proportion of which have good surface prospects, but not sufficiently developed to say anything definite about them.

#### OFFICE STATISTICS—ALBERNI DIVISION.

Free Miners' Certificates issued .....	239
Mineral Claims Recorded .....	441
Certificates of Work recorded .....	294
Certificates of Improvements recorded .....	12
Bills of Sale recorded .....	187

#### REVENUE COLLECTED.

Free Miners' Certificates .....	\$1,430 00
Mining Receipts, general .....	2,829 20
	<hr/>
	\$4,259 20

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#### WEST COAST OF VANCOUVER ISLAND MINING DIVISION.

##### REPORT BY WALTER T. DAWLEY, MINING RECORDER.

Since the opening, last July, at Clayoquot, of a Mining Recorder's office for the West Coast of Vancouver Island Mining Division, prospectors have worked hard and well on the hills along the water front and creeks, with the result that one hundred and fourteen mining claims have been recorded, of which four are placer.

Many of the owners of mineral properties are now doing further development work, sinking shafts and driving tunnels.

Very little ore has, up to the present, been shipped from this Division, although the returns have been very satisfactory from the shipments made.

A great drawback to the Division is the lack of suitable trails and roads. Prospectors are doing a good deal of work on their properties, but are unable, financially, to build good roads.

#### DEER CREEK.

*Crow Group*.—This group was among the first to be recorded in the Division. The ore on dump, of which there is about 200 tons, is copper ore of good quality, carrying gold. Claims adjoining are the *Lady R.*, *Lady S.*, and *Two Sisters*.

*Star*.—Considerable work has been done on this claim, about 200 tons of gray copper ore being on the dump.

*Jumbo*.—This is a very recently recorded claim in the same section of the Division. The ore is bornite.

*Hetty Green Group*.—A group of seven claims on which considerable work has been done. Two assessments have been recorded.

#### HESQUOIT.

Considerable work has been done in this section of the Division, the claims proving very satisfactory; copper ore predominating. The *Guldemar* and *Thelma Groups* look well for the amount of work done.

#### TRANQUIL CREEK.

The properties here are looking well. Ten or twelve claims have been surveyed, and comfortable cabins and good trails made. It is reported that work will be resumed in the spring, when a wharf will be built for shipping.

#### BEAR RIVER.

Copper ore and gold-bearing quartz of good quality are found in this section. *King Richard*, *Castle* and *Seattle Groups* have had a lot of work expended on them, with good results. A considerable number of tons of ore are on the dump.

Placer claims on this river have been recorded by experienced placer miners who report favourably on their finds.

#### TROUT RIVER.

Copper ore and gold-bearing quartz have been found here. The *Helga Group* is reported as having 45 to 50 tons of ore on the dump.

#### CATFACE MOUNTAIN.

Work has been done on the properties on this mountain, a 20-foot tunnel having just been completed on one claim. The ore carries a considerable percentage of copper.

#### DISAPPOINTMENT INLET.

The *Iron Cap Group* situated on this Inlet has had a lot of work done. About 20 tons of ore have been shipped, the proceeds of which more than paid for the work done on the group. The owners are now working with a view to making regular shipments.

#### SYDNEY INLET.

A large amount of work has been done in this neighbourhood. The *Indian Chief Group*, on Peacock Mountain, has a 250-foot tunnel in, with some tons of bornite ore on the dump, which is now being sacked ready for immediate shipment.

The *Anaconda Group* has had a lot of work done on it, showing it to be an exceptionally good prospect.

This section is one of the most promising in the Division.

#### ELK RIVER.

A camp was started here last May since which time work has been uninterruptedly carried on. Ore has been shipped from time to time for mill tests.

#### CLAYOQUOT RIVER AND KENNEDY LAKE.

There are quite a number of good claims in these sections, and a proportionate share of work done on them.

#### OFFICE STATISTICS—WEST COAST OF V. I. DIVISION.

Number of Full Mineral Claims Recorded.....	106
"    Fractional    "    "    .....	4
"    Placer Claims    "    .....	4
<hr/>	
Total.....	114
Number of Assessments Recorded.....	64

#### FEEs COLLECTED.

Free Miners' Certificates.....	\$140 00
Mining Receipts.....	549 25
<hr/>	
	\$689 25

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## NANAIMO DISTRICT.

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### TEXADA ISLAND.

During the last week of October, the Provincial Mineralogist made a trip to Texada Island, being taken over from Union Bay, V. I., on the "City of Nanaimo," which, through the courtesy of Mr. James Dunsmuir, made a special trip for that purpose.

#### VAN ANDA AND MARBLE BAYS.

The time available only permitted of a hurried examination of the properties in the immediate neighbourhood of Van Anda Bay, the best known of which are the properties held by the Van Anda Copper and Gold Co., of which Company Ed. Blewett, Vancouver, is President and Manager; H. W. Treat, 68, Wall St., New York, Secretary-Treasurer; and Thos. Kiddie, Superintendent at Van Anda.

From what examination I was able to make of this immediate locality, Van Anda Mine. I was of the opinion that the ore found occurred either in, or intimately associated with, a series of dykes, apparently of felsite, which cut through the very highly altered and crystalline limestones which form the country rock in this locality.

The old *Van Anda* shaft, a somewhat irregular incline, down 92 feet, following the dyke and having a level at 60 feet down, driven some 94 feet; while at 92 feet down, levels have been set off on either side 50 and 134 feet respectively, from which levels drifts have been run amounting in all to some 100 feet. Between these two levels a considerable amount of stoping has been done and a large amount of the ore-bearing matter taken to the surface, from which some 500 tons of shipping ore has been sorted out, and sold for shipment to Swansea. This sorted ore is reported to me as carrying from 10 % to 15 % copper, 7 ounces silver, and \$7.00 in gold.

The new *Van Anda* shaft is vertical, sunk from the surface to a depth of 230 feet, and cutting one of the levels from the old shaft at a depth of 92 feet, while at a depth of 175 feet, and also from the bottom of the shaft, levels were being started off, but at the time of my visit had only progressed a few feet.

I am since informed by the surveyor that the 175-foot levels have now reached a distance from the shaft of 25 and 30 feet, while the levels from the bottom of the shaft are now off about 75 feet. The new shaft seems to have been in or near the ore-bearing body all the way down, and at the lower levels the body seems to be increasing in size.

The ore-body carries, scattered through it in irregular masses, bornite and chalcopyrite, carrying certain values in silver and gold. The ore is of such character that the No. 1, or shipping ore, can be easily hand-sorted, but the percentage of such shipping ore is rather uncertain.

Above the 92-foot level, that is in the workings from the old shaft, little or no work has been done this past year. The ore chute above this level would not appear to have exceeded 100 feet in length, and would seem to have been practically stoped out as far as it is known to exist, and no new ore-bodies have been here shown up by development.



The work in the new levels, the 175-foot and the 230-foot, had not progressed far enough, at the time of my visit, for me to form an accurate opinion of the ore chute at that depth. The ore-bearing body in these lower levels appeared to be wider, but the quantity of ore therein did not seem to have increased.

The property must still be classed as a prospect, even though so much development work has been done, as there is no "ore in sight," as the term is understood by mining men, nor has the size of the ore chute been determined.

*Plant*—The hoisting plant consists of a small boiler and hoist, in a temporary building. A small pump is also in use, and it is apparently sufficient for the requirements.

An ore shed had been constructed near the mine, in which was stored a certain amount of ore already sold, but which had not been removed.

Preparations were being made for the erection of a substantial shaft-house and sorting-shed, with bins, etc. It was also expected that a new and suitable hoisting plant and an air compressor would be erected this winter, to facilitate the development.

A location held by the same company, and situated some half-mile  
**Cornell Mineral Claim.** from the *Van Anda* shaft. On the hill side an outcropping of apparently a felsite dyke in contact with a whitish crystalline limestone, had been stripped for a few feet on the surface, the line of contact running nearly east and west, the dip being about 80°.

In the felsite near the contact there appeared a deposit of bornite and yellow copper, which looked very promising, but the size of which was still to be determined, as, on October 27th, nothing more than a few feet at the surface was in sight.

An open cut, through soft wash, was being run in some 20 feet below, but had not at that time reached solid formation.

Mr. Going, P.L.S., who made survey of the claim on December 15th, reports to me that at that date the open cut had reached solid rock, and that a 28-foot tunnel had been run in, cutting at the face the white lime at a depth of 30 feet from the surface, while the felsite in the last 8 feet of tunnel was strongly mineralized with copper sulphides.

A location, also held by the same company, is situated about half a  
**Little Billie Mineral Claim.** mile from the *Van Anda* shaft and some 100 yards from the beach on the east shore of the Island. At the time of my visit no work had been done on this claim since it was reported upon last year, but preparations were being made to further prospect the property.

The rock formation would appear to be a crystalline limestone underlayed by an intrusive granite of probably later origin, the whole being cut by more recent igneous dykes, probably diorite and felsite. The felsitic dykes, at and near the contact with the granite, are more or less heavily mineralized in places with chalcopyrite and iron pyrites, carrying some gold and silver.

The work done consists of a 60-foot tunnel, from which some short drifts have been run, and on which an irregular chamber has been stoped out, said to have contained a body of good ore. Near the mouth of the tunnel a shaft or winze has been sunk, said to be 40 feet deep, with a 40-foot drift from the bottom to the contact, but these were full of water and I could not personally inspect them.

Some 50 tons of ore had been sacked and lay in an ore shed on the property, having been sold to Mr. Pellew-Harvey, as agent for a Swansea concern.

*Townsite*.—The Van Anda Company has platted a townsite at Van Anda Bay, on which some clearing has been done. A manager's house has been erected on the shore, while further back, and on the way to the mine, there are three or four buildings—consisting of a boarding-house for the men, store, laboratory, etc. Preparations were being made for the erection on the town site of a 50-ton water jacket smelter, the plant for which was awaiting transshipment in Vancouver, ready for erection. This, I understand, is now in progress, under the superintendency of Mr. Kiddie, late assistant superintendent of the Orford Copper Company, of New York. A concentrator was also in contemplation, but, as far as I have heard, no actual move has been made in that direction.

**Marble Bay  
Mineral Claim.**

Superintendent, F. W. McCready; situated about one-quarter mile to the north of the *Van Anda* shaft, and about the same distance from the shore of Marble Bay.

The development, in addition to a lot of surface stripping and shallow cuts, consists of a well-timbered, double-compartment shaft, 100 feet deep, from the bottom of which two drifts, respectively 40 and 50 feet long, had been set off at right angles, but had converged in their courses until they were within a few feet of meeting at the ends.

The conditions here are very similar to those in the Van Anda, the ore, somewhat irregularly distributed through an igneous dyke, consisting of copper pyrites and white iron, carrying gold values, while some good bornite ore was obtained in sinking the shaft.

No ore in quantity was visible in the drifts, though the dyke-matter was more or less mineralized, while in the shaft, being timbered, the rock could not there be seen.

On the dump was some 50 to 60 tons of ore—classed as second grade—while a lot of first grade ore, said to amount to 100 tons, was sacked ready for shipment, and was reported to me as having assayed 8 % copper, 12 oz. silver, and \$25 in gold. This ore was, it is said, practically all taken from the shaft in the sinking.

I was unable to distinguish any defined ore-body in the drifts, while on the surface the dyke, though strong and well mineralized in places, could not be traced in any one direction for any great distance.

*Plant*.—The plant consists of a steam boiler, hoist, pumps, etc., which were, on October 27th, then being erected, together with a well-planned and commodious shaft-house, a subject of illustration in this Report.

A blacksmith and carpenter shop, together with suitable accommodations for the men, have also been erected.

*Townsite*.—In connection with this mine a townsite has also been platted, situated on Marble Bay. So far, the buildings on the townsite consist of a large and well-equipped hotel, and a few small houses.

*Dock*.—A small but substantial pile wharf was built on one of the inner arms of the Bay, and here the steamers of the Union S.S. Co. make landings on their semi-weekly trips along the Coast to and from Vancouver.

Within a few yards of the shores of Marble Bay there are large deposits

Lime and of highly crystalline limestone, in some places of such a quality as to be  
Marble Quarries. suitable for use as ornamental marble, large blocks of which have recently been taken down to Vancouver to be worked, so as to practically test its quality, and I am since informed that the tests have been highly satisfactory.

The limestones, in the immediate vicinity, have already been worked for lime making, and have turned out a product of exceptional purity, but at present the kilns are not in operation.

### PHILIPPS ARM AND SHOAL BAY.

On leaving Texada Island, the Provincial Mineralogist made a brief visit to Philipps Arm and the surrounding Bays, staying in Shoal Bay over one trip of the steamer, some four days.

This district is situated on the West Coast of the Mainland, about 120 miles north-west from Vancouver, and is reached by the Union S.S. Co.'s line of steamers from that city, running twice a week. This whole section of the Coast is included in the Nanaimo Mining Recording Division.

Shoal Bay is the only attempt at a town in the district, and consists of a store, an assay office, two hotels with moderate accommodations, and a few houses, and is the centre of supply for the mining and lumber camps for many miles around. The hotels were full to overflowing at the time of my visit, and I would have been at a loss to find accommodation but for the kindness of Mr. E. Pooke, agent of the Gold Fields of British Columbia, who kindly placed at my disposal an unoccupied furnished house belonging to his company.

The whole Coast line is much indented by deep waterways, and the head-lands and islands are high and rocky, with steep sides, covered with heavy timber to the water's edge. The waterways are so numerous that they form the natural roadways or lines of communication between all points, the great depth of water, maintained to within a few feet of the shores, enabling the largest steamers to deliver supplies or machinery at any camp. Local communication is maintained by boats and canoes, while at Shoal Bay there are two steam launches, the "Sea Lion," Capt. J. H. Murray, and another, which can be hired at very reasonable terms, either for the day or trip.

The country rock, generally, is composed of bluish shales and masses of igneous rocks, granites and porphyries, cut by more recent igneous dykes, the general features of the district being composed of igneous rocks.

The country would appear to be traversed by a series of immense quartz ledges, running in a general N.W. and S.E. direction, and, in places, mineralized with iron sulphides, carrying gold, with possibly some free gold in the quartz.

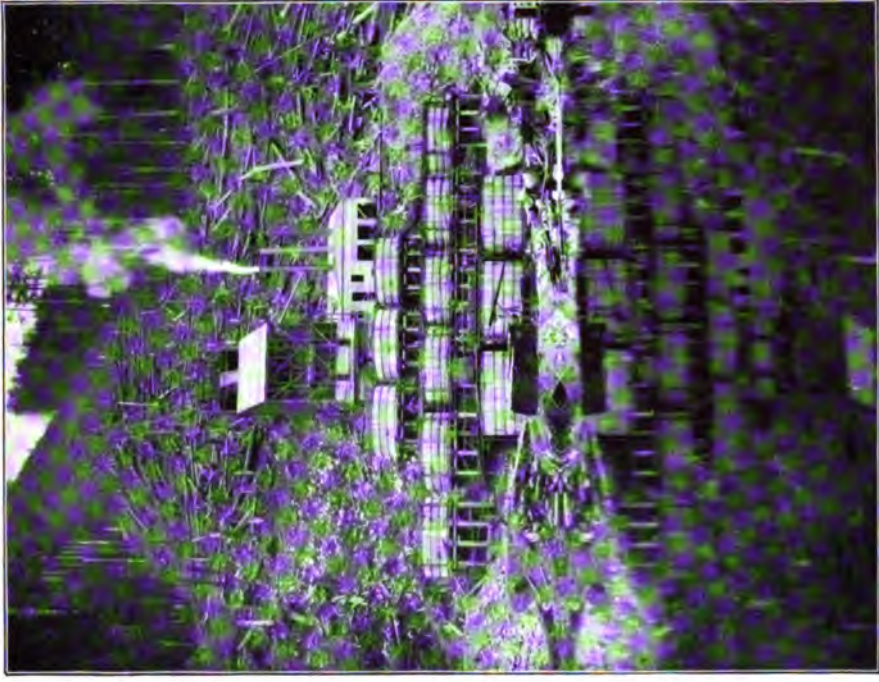
The ledge best known from development work is that upon which the *Doratha Morton*, *Alexandria*, and other claims are located. This is first met with on the west side of Philipps Arm, and presumably crosses under Cordero Channel, re-appearing at Channe Island, and again on Valdes Island. It is over 100 feet across and is mineralized very considerably in places, though not throughout, with iron sulphides carrying gold, as described elsewhere in detail.

#### DORATHA MORTON MINE.

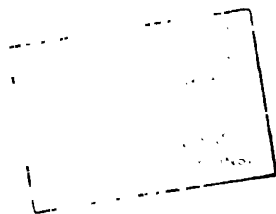
This is a Crown-granted claim, situated on the hill, directly west of Fanny Bay—a branch of Philipps Arm—at an elevation of 2,600 feet, and about  $1\frac{1}{4}$  miles from the mill-site on Fanny Bay. This claim is one of some twelve claims owned by, and four claims bonded to, the Fairfield Exploration Syndicate, of London, of which Mr. J. J. Lang, of Vancouver, is the local manager. These claims are all on the same quartz ledge, and have all been explored and prospected sufficiently to show that the ledge runs through all of them, either on the surface or, presumably, at a depth. Important development has, however, been confined to



VENTILATING FAN, MADE FROM CEDAR SPLIT WITH AXE,  
"ALL UP" MINE, PHILIPP'S ARM.



"DORATHA MORTON" CYANIDE PLANT, FANNY BAY,  
PHILIPP'S ARM.



the *Doratha Morton*. In this claim the ledge runs about N. 80° E. (mag.), or nearly with the range of hills, with a dip of about 70° to S., and upon the outcrop some test shafts, etc., were sunk. Satisfied with the results here obtained, the management started a cross-cut tunnel, about 100 feet vertically down the steep hillside, and known as No. 1 tunnel. This tunnel, having a general southerly course, was run about 44 feet through the country rock, when it cut the hanging-wall of the ledge. Continuing in the same direction, the tunnel cut through the solid quartz ledge for 100 feet, when the hanging-wall of the ledge was reached—a dark granite or porphyry. In thus cross-cutting the ledge, it was found by assay that while the whole ledge was gold-bearing, certain portions of it were much richer than others, the richest rock occurring near the hanging-wall, and forming a well-defined “pay streak.” Following this “pay streak,” drifts were driven to the east and west, along the line of the ledge.

The *East Drift* was in from the tunnel about 300 feet, with cross-cuts occasionally, and at the face was about 200 feet below the surface. This drift, about half-way on its course, cuts a 50-foot dyke, which appears to have faulted the lead some 20 feet, but has not affected it otherwise, as the “pay streak” was found on the other side and easily followed.

The *West Drift*, similarly following the “pay streak,” has been run 220 feet to the west, on the ledge, when it came to the surface. A smaller diorite dyke was encountered in this, but it was cut and the lead found on the other side, only slightly faulted.

The “pay streak” is visible in these drifts throughout their length, and has a banded structure, due to darker layers of quartz and bands of iron pyrites. The width of this “streak” is averaged at 4 feet 6 inches, and the average assay, as given me by Mr. Lang, is \$25 in gold—the result of assays of samples cut right across the “pay streak” at regular intervals of about 12 feet. Lying next to the “pay streak,” and farther from the hanging wall, is a band of white quartz about 6 feet wide, which has been similarly sampled, and is said by Mr. Lang to carry \$10 in gold to the ton. Next to this again is a zone 15 feet wide, which is similarly reported as carrying \$5. These values are said to be maintained with remarkable regularity throughout the entire 520 feet of drifts.

The “backs” rendered available by this tunnel and drifts will average over 100 feet in height, and there is no reason to think that the length is limited by the 520 feet of drifts now driven. The ore taken from these drifts is now on the dump, and will be used for the first few months’ run of the new Cyanide plant described later.

Regarding No. 1 Tunnel and its drifts as “development work” only, and feeling justified by the development, Mr. Lang has started a Main or Working Tunnel some 200 feet vertically below No. 1 Tunnel, and slightly to the west. It is calculated that this will have to be driven about 520 feet before it cuts the ledge. This work is being pushed ahead with all possible speed, two air drills being used, supplied with air from the mill-site at sea level.

Just below the Main Tunnel, large ore bins were being constructed, from which the ore was fed by gravity into the buckets of the Bleichert wire rope tramway, over which the ore is to be conveyed to the Cyanide Plant on Fanny Bay. The ore now on the dump at No. 1 Tunnel will be carried into these ore bins by a short, surface, “back balance” tramway, about completed, and should be sufficient to run the plant until the main tunnel is in operation.

The length of the tramway is about 1½ miles, the fall in that distance being about 2,100 feet, with a comparatively uniform grade. The buckets, carrying 600 lbs. of ore each, are to be run at intervals of 600 feet, and at the rate of 334 feet per minute, thus delivering about 10 tons per hour. The right of way for the tram has been cleared about 100 feet on either side of the line—no easy matter when trees from 4 to 7 feet in diameter were encountered.

**Crusher.**—The ore is delivered by the tramway on to a “grizzly,” the Cyanide Plant. “fines” going directly into bins, while the “roughs” pass through a Blake crusher, and then into the bins, which are capable of holding about 100 tons of ore.

**Stamp Mill**—The ore is fed from the bins, by Challenge feeders, to two 5-stamp Morison High Speed Mills, of which a more detailed account will be given farther on, as they are a novelty in this country.

**Settling Tanks**—The crushed ore from the stamps is conveyed direct to settling tanks, of which there are three, 20 feet in diameter and  $7\frac{1}{2}$  feet deep, provided with distributors to ensure mixing of fine and coarse ore.

**Treatment Tanks**—The ore is discharged from the settling tanks, by bottom-discharge openings, into cars, and delivered to any of the 6 treatment tanks (also  $20 \times 7\frac{1}{2}$  feet) situated just below. The ore is here leached by the cyanide solutions, run on for from 6 to 8 days.

**Solution Tanks**—The solutions flow over to the 3 solution tanks (20 feet diam. by 10 feet deep) just below, while the tailings are sluiced away through the bottom of tank to the sea. The gold is precipitated from the cyanide solutions in two boxes provided for the purpose.

The plant is run by a 12 x 18-inch engine, supplied with steam from three 50 horse-power locomotive boilers, which also supply the Rand compressor which feeds the drills at the mine.

A very good general idea of the arrangement of the plant can be had from the accompanying cut, made from a photograph taken by me at the time of my visit.

The mill at the *Doratha Morton* is the first of its kind to be erected in Canada, if not in America, and, in view of the claims made as to what it has done elsewhere, a short description of the mill seems in place, and for such description I am indebted to the manufacturers, as I also am for cuts illustrating same.

“The crushing power of a gravity mill depends on the weight of the heads, the height of the drop, and the number of drops per minute.

“Modern weights range from 700 to 1,200 lbs., falling through a distance of 6 to 9 inches, at a rate of 90 to 100 drops per minute.

“How to obtain an increased output per stamp head is a problem of great commercial importance. The limit has been reached with the cam stamp, as the mechanical properties of the cam will not admit of an increase in the number of drops per minute, or in weight of head, but with this block to progress removed the modern stamp battery is capable of great development.

“The problem of increasing the output of a gravity stamp mill has been dealt with by Mr. D. B. Morison, on the principle of ‘leaving well alone,’ as he retains almost every detail of a modern mill except the cam and tappet.

“The principal features of the Morison High Speed Stamp Mill may be summarised as follows :—

“The stamps, whilst following under the influence of gravity, can be operated at speeds ranging from 130 to 150 drops per minute, according to the length of drop, as compared with the 90 to 100 drops per minute attainable in the most modern cam stamp batteries.

“The mechanical properties of the mechanism are such that stamps of far greater weight than the heaviest which it is practicable to use in cam stamp batteries can be operated with ease, certainty, and absence of destructive shocks.



"A Morison mill, with any weight of stamps up to 1,500 lbs., can be readily substituted for an existing light cam stamp mill in a few hours, as the machine has been specially designed to fit the frame of any ordinary standard cam stamp battery.

"In such a case of substitution, the existing battery and bin framing, platforms, mortar box, head shoes, dies, and line shafting would be retained in use exactly as they stood.

"The important advantages accruing to these features are briefly as follows:—

"A practically realizable increase of crushing capacity per stamp, of about 40 % due to the increased number of drops per minute, and 25 % due to increased weights of stamp-head, or a total increase of 65 % achievable by the substitution of Morison High Speed Mills for the heaviest and most modern cam stamp mills. Expressed in another way, this means a reduction of about 40 % in the number of stamps required for a given daily crushing capacity.

"The number of stamps being thus reduced, a very great saving is consequently effected in the heavy items of transport, foundations, framing, buildings, line shafting, etc.

"On the top of the king posts is a crank shaft with cranks at equal angles, each of which is provided with a connecting rod jointed to a cylinder, so that, as the crank revolves, the cylinder moves up and down. Within the cylinder is a deep, solid plug or piston, the rod of which passes through the cylinder bottom, and constitutes the stem to which the stamp head is attached. A jacket surrounds the cylinder, and at a few inches from the bottom is a port or opening, communicating with the jacket space. The cylinder, below the piston, is filled with liquid, for which both piston and the water level in the jacket are air spaces, with free communication between them.

"The head strikes the rock on the die before the cylinder has completed its downward stroke, so that, at the end of the stroke of the cylinder, the bottom of the piston is above the port in the side of the cylinder, and the liquid flows in.

"As the cylinder returns on its upward stroke, the liquid is squeezed through the port from the cylinder into the jacket space, which has the effect of gradually and smoothly overcoming the resistance of the weight, until, when the bottom of the piston closes the port, no more liquid can escape, and any further upward movement of the cylinder will raise the stamp head on an incompressible liquid buffer.

"The blow causes a rebound of the head, and while still rising therefrom the liquid 'pick-up,' catches the weight, and the energy required to move a body from rest is thus saved, causing a very considerable economy in power required to work the battery. So gradual and smooth is the effect that, whether the weight be 100 lbs. or 1,500 lbs. or more, there is not the slightest shock on the mechanism, and in this respect it constitutes a very great improvement on the sledge-hammer upward blow delivered by a cam.

"When the cylinder and the stamp head have completed the up-stroke, the cylinder descends, under the control of the crank, at a velocity exceeding that at which the stamp head would fall under the influence of gravity, so that there is no retarding friction. It will thus be seen that, while the lifting of the stamp is controlled by the crank, the falling and the crushing effect are due to gravity.

"The wearing away of the shoes and dies is very simply compensated for in the following manner:—

"The piston rod and the stem which fits into the stamp head are connected together by means of a long cast-steel sleeve, into the top end of which the tapered end of the piston rod is fitted, and in a parallel hole, in the other end of which the end of the stem is rigidly held by means of a gib and three keys, exactly similar to the holding device which has withstood the test of time in the familiar cam-stamp tappet.



"When the lowering of the stamp and piston, due to wear of shoes and dies, renders it necessary to re-establish the original relative positions of the piston and cylinder port by restoring the normal lengths from piston to die, the sleeve keys are slacked back, the sleeve and piston rod raised the required amount, and the keys driven in again. The operation is so simple and speedy that there is no reason why the adjustment should not be made for every three-eighths of an inch of wear.

"By means of a drain plug provided in the cylinder, the stamps comprising a battery can readily be stopped individually, and the above adjustment effected on one at a time.

"In order to test the reliability of the mechanism, the Morison mill has been run for lengthy periods, in England, during the past two years, and stamps of 1,600 lbs. weight have been successfully worked at 132  $7\frac{1}{2}$ -inch effective drops per minute, the drops being measured to the point at which the stamp came to rest, and not to the bare die.

"A series of exhaustive tests of 'cam' and Morison mills are now approaching completion, and as soon as the data obtained are ready, in a collective form, for publication, the mining public will have the information placed within its reach through the medium of the technical press."

#### MISCELLANEOUS PROPERTIES.

Alexandria Mineral Claim. Is located on Picton Point, on Philipps Arm, and is in all probability on an extension of the *Doratha Morton* lead. The claim is a mineral location and is owned by the Philipps Arm Gold Mining Co., and extends from the shore inland.

There is an outcropping of a very large quartz ledge near the shore, the strike of the lead being N. 65° W. Upon this ledge a tunnel has been run in about 180 feet parallel with the strike. At a point 90 feet from the mouth of the tunnel, drifts have been driven to the right and left for 45 feet in each direction, neither of which has reached the wall of the ledge. Near the face of the tunnel a 15-foot porphyry dyke cuts across, apparently faulting the ledge slightly.

Above this tunnel some 50 feet, is another tunnel, which I could not get into, as it was caved in.

There does not appear to be in this property the defined paystreak, noted in the *Doratha Morton*, and the ledge does not appear to be as highly mineralized.

A trial shipment of ore is said to have been made to a smelter, and an assay of \$28 in gold received.

All Up Mineral Claim. Is near the *Alexandria*, and has a tunnel in about 110 feet, running about magnetic west, some 6 feet above water level, and following an irregular quartz vein, about 24 inches wide, which contains a small amount of white iron sulphides.

Yuctaw Mineral Claim. Situated on the north end of Channe Island. On the property there is an out-cropping at the water's edge, of white quartz, as exposed 30 to 35 feet wide, very similar in character to the *Doratha Morton* ledge, and very possibly a continuation of the same. The mineralization, however, is slight, consisting of iron sulphides. No work has been done on this out-crop. About 100 feet to the east of this is a pit 10 feet deep, showing 6 feet of quartz lying alongside of a diorite dyke, and showing rather heavy mineralization with fine-grained iron pyrites, more marked near the dyke. The ledge runs about with the length of the island, and is more or less stratified.

Owned by the Frederick Arm Mining Company, of which R. D. Blue Bells Fetherston is Superintendent. The claim is situated to the north-west of Mineral Claim. Frederick Arm, about one mile, and at an elevation of about 1,800 feet above the sea.

A tunnel has been driven in over 200 feet on a large quartz ledge. At 75 feet in, a drift has been set off to the left 50 feet, at the end of which a winze is down 25 feet, but was full of water. From the same point a drift was run 30 feet to right, and a 40-foot winze sunk, also flooded at the time of my visit. Some 25 feet further in, two small cross-cuts had been driven for about 15 feet in what was apparently a cross-course ledge of white quartz.

The rock is very much cut up by igneous dykes, and the mineralization, iron sulphides, seems to be more marked in and near these dykes.

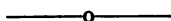
I was informed that it was the intention of the Company to immediately start a tunnel some 150 feet lower down the hill, and if this proves as satisfactory, a stamp mill would be erected on the property.

Situated on the west shore of Philipps Arm. A large quartz ledge, from Annie Laurie 50 to 60 feet wide, is exposed on the property, and a cross-cut tunnel is Mineral Claim. being driven, in order to cut this, and was in about 25 feet on November 1st.

On the west shore of Philipps Arm, a claim held by The Gold Fields Ingersoll of B. C., Ltd. The lower tunnel, driven in S. 70° E. for 75 feet, is in felsite Mineral Claim. and trap dykes, and is very wet. The mineralization is slight and consists of iron pyrites in large cubes, occurring in the dykes. Another tunnel has been driven about 50 feet above and 40 feet to the left of the lower tunnel, and was in some 30 feet, while near the face a winze had been sunk for about 10 feet.

There are over 200 claims recorded in the immediate neighbourhood of Shoal Bay, but I was unable to visit any others of importance in my flying trip, as the weather was so bad as to seriously retard progress from point to point.

Some of the claims above Shoal Bay, on Thurlow Island, give considerable promise, but so far lack sufficient development to prove their values.



## NANAIMO MINING DIVISION.

### REPORT BY M. BRAY, GOLD COMMISSIONER.

I have the honour to submit my third annual report for the Nanaimo Mining Division, for the year ending 31st December, 1898. The Yukon excitement has acted as a set-back to development work in this district for the past year, and the recording has fallen off greatly from what it was in 1897.

#### OFFICE STATISTICS—NANAIMO DIVISION.

Free Miners' Certificates issued .....	381
Mineral Claims recorded .....	566
Placer " .....	4
Certificates of Work recorded .....	475
Paid \$100 each in lieu of work, recorded .....	5

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Certificates of Improvements recorded. ....	20
Bills of Sale recorded. ....	204
Abandonments recorded. ....	18
Grants of Water Rights recorded. ....	6
Mill-site Leases issued. ....	2

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The total revenue from the above, for the year ending 31st December, 1898, has been \$6,463.60, to which must be added \$26.49, Mineral Taxes paid for the year.

One thousand six hundred and fifty-four records of mineral claims lapsed during the year 1898, the work not having been recorded, and I have 1,000 records in good standing on the 31st December, 1898. Nearly all of these mineral claims are along the coast line, or within easy reach of the coast.

The mineral claims in the Dunsmuir and Cameron Lake districts have good waggon roads and trails leading to them.

Considerable development work has been done on Texada Island during the past season, with very encouraging results.

The Van Anda Copper and Gold Company has sunk a shaft on the *Copper Queen* 210 feet deep, and has opened up a good body of ore. It has a steam hoist on the claim and is now clearing a site for the erection of a smelter for the reduction of its ores.

The latest strike on the *Cornell*, belonging to the Van Anda Company, from present appearances promises to be the richest in minerals of any claim on Texada Island.

On the *Little Billey*, also belonging to the Van Anda Company, a shaft has been sunk 50 additional feet during the past year.

The *Raven*, owned by the Spratt Copper and Gold Company, has some good ore. The shaft, operated by steam hoist, is down 100 feet, but is now in a fault which seems to have thrown the vein over.

On the *Peto* mine a shaft is being sunk and good ore is showing. This mine has been purchased by Rockefeller.

The *Marble Bay* mine, owned by J. J. Palmer, has a steam hoist and the shaft has been sunk 100 feet during the past year.

The *Jack North* is owned by the Puget Sound Iron Company, has a steam hoist and the shaft has been sunk 200 feet and about 100 feet of tunnels from the shaft have been driven during the past year. The Company has opened up a fine body of copper ore, and is preparing to put up smelters on the ground. It has contracted to ship 5,000 tons of iron ores to the Everett smelters, to be used as a flux in smelting other ores.

The Texada Island Mining and Land Company, Limited, has two shafts, down 30 and 50 feet respectively, showing ore of good value. There are several other shafts on the property, from 20 to 40 feet deep, also showing pay ore.

At the *Surprise* mine the shaft has been sunk about 200 feet during the past year, and is now about 400 feet deep, being the deepest shaft on Texada Island. The ore body in this claim is large and of good value the entire depth.

The *Copper King* has been sunk on 20 feet, and the ore looks well.

The *Silver Tip* mine has a steam hoist, and has been sunk on 200 feet during the past year, showing good copper and gold ores.

The Victoria Texada Company has a shaft down 75 feet, and the ore is of good value.

The Texada Kirk Lake Gold Mining Company, Limited, has a shaft down 105 feet, with tunnels, and three new shafts have been started, all in ore of good value. This Company has not done much during the past year, but expects to start up again at an early date.

The *Lorindale* has two shafts, down 50 and 70 feet each, with good ore in sight.

The *Nutcracker* is down with a shaft 30 feet, with good ore in sight.

The *Island Queen* shaft is 25 feet deep, with 70 feet of tunnelling, on good ore.

The *Lion* and *Tiger* claims have shafts sunk to a depth of 60 and 40 feet, showing good ore.

The *Comet*, *Woodpecker*, *Susie*, and *Josie* have had prospecting shafts sunk on each of the claims to about 20 feet, and they all show good ore.

The *Chemainus*, *Mabel*, and *Texada* group of claims has a steam hoist, and a shaft has been sunk 55 feet deep, showing good ore.

The *Black Prince* claim has a shaft sunk about 40 feet deep, showing good ore.

The Duluth, Minnesota and Texada Company has sunk a shaft 80 feet deep on its property, showing good ore.

There are numerous other claims than those above mentioned on which work is being done, and which have good showings of ore, and no doubt the coming year will see new and valuable mines opened up on Texada Island.

There are about three hundred people residing on the Island now. They have a hotel, general store, butcher shop, and a post office at Sturt Bay and at Van Anda Bay. A large lot of lumber, doors, windows, etc., has been landed at Sturt Bay for building a new hotel and a number of private residences, and the coming season promises to be lively at Texada Island.

On the coast, from Texada Island to the northern end of Vancouver Island, taking in Jarvis Inlet, Powell Lake, Malaspina Inlet, Toba Inlet, Frederick Arm, Philipps Arm, Loughborough Inlet, Knight's Inlet, and all the islands lying between Vancouver Island and the Mainland, a great number of mineral claims have been recorded, and wherever development work has been done the results have been satisfactory. Many of these places are known to possess real mines, and their active operation is a certainty. One of these mines is the *Doratha Morton*, situated at Philipps Arm, owned by the Fairfield Exploration Syndicate, who also own fourteen other claims adjoining and on the extension of the *Doratha Morton* ledge. The Company has driven 1,200 feet of tunnels, which tap the ledge 90 feet from the surface. The width of the ledge is 100 feet, but they only intend at present to work 10 feet of the ledge which contains the best paying ore, and which is well defined. The Company is driving another tunnel to tap the ledge at 300 feet from the surface. The driving is done with machine drills, the power for which is supplied from the mill-site on the beach, the compressed air being carried up through a 4-inch pipe. The compressor was supplied by the Rand Drill Company, and is capable of running four drills. The ore is conveyed from the mine by an aerial tramway,  $1\frac{1}{2}$  miles long, to the chute and ore bins, where it passes through a grizzly and a Blake-Marsden-Stern Crusher, thence to the 10-stamp Morison High Speed Mill, the ore afterwards being treated by the cyanide process to extract the gold. The whole plant is driven by an engine, the steam for which is provided by three 50-h.p. locomotive boilers. The Company expects to make its first clean-up shortly, and, judging from the nature and assays of the rock, should earn handsome dividends.

The *Douglas Pine* mineral claim at Shoal Bay, Thurlow Island, is being developed by a tunnel, which will tap the ledge at 200 feet from the surface.

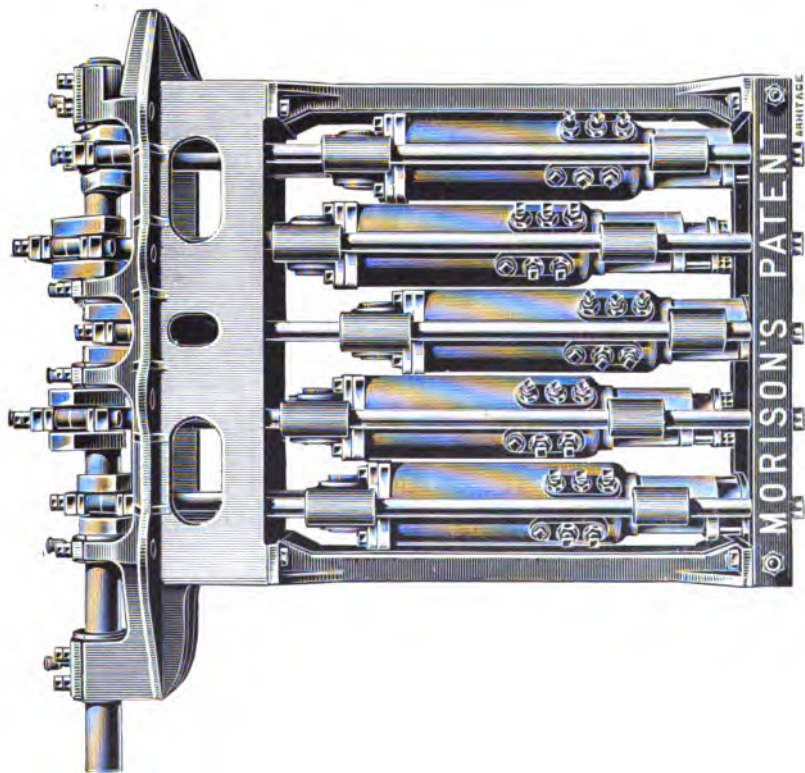
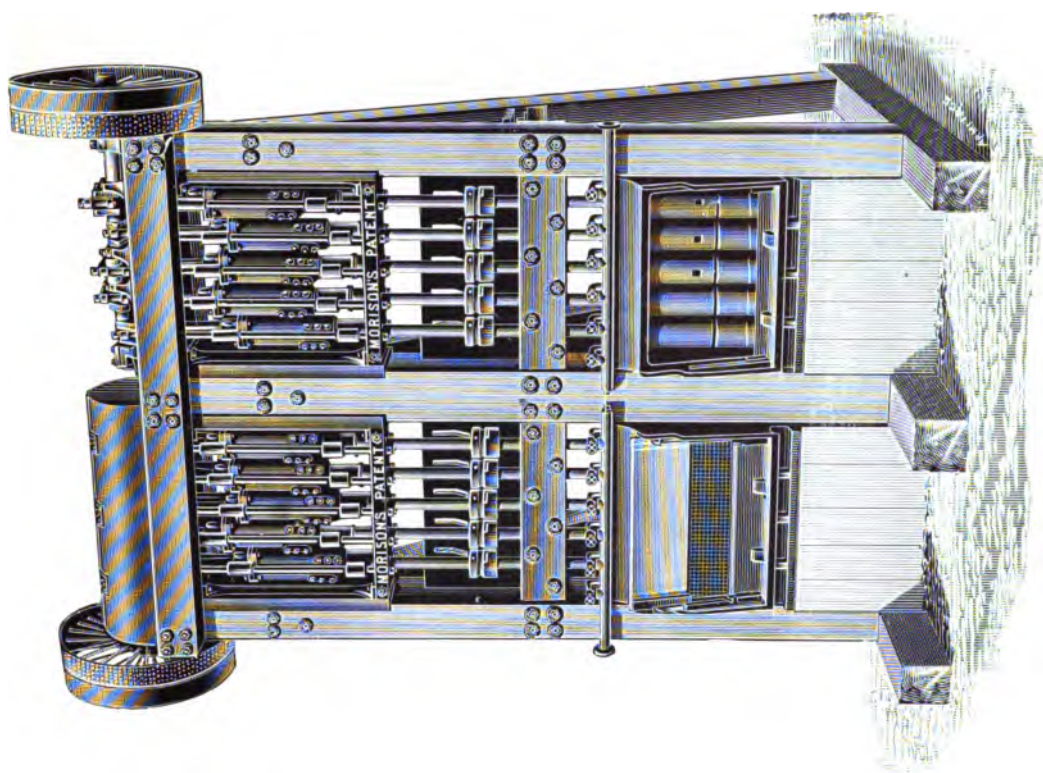
At Frederick Arm, a good deal of development work has been done during the year on the *Blue Bells* and other mineral claims, with good results. The owners of mineral claims all along the coast line are preparing to make extensive developments during the year 1899.

Considerable development work has been done in Dunsmuir District, out beyond the Nanaimo Lakes, with very promising results, notably on the *Pittston Group* of eight claims, owned by the Jubilee Partnership Company, which has run a tunnel 240 feet, which, it is expected will strike the ledge about 50 feet ahead.

The *Copper King* and other claims owned by the Cameron Lake Mining Company, Limited, situated at Cameron Lake, have had considerable work done. One tunnel has been run 150 feet, and two winzes 20 feet each. A second tunnel was run 303 feet to tap the ledge at 300 feet from the surface, but there is between 30 and 60 feet yet to run. If as good ore is found in the lower tunnel as in the upper one, they should have a paying property.

The mineral claims recorded during the year ending 31st December, 1898, are situated in the following places throughout the Nanaimo Mining Division, viz. :—

Texada Island.....	162
Lasqueti " .....	5
Valdes " .....	33
Thurlow " .....	15
Channe " .....	2
Rodonda " .....	5
Cortes " .....	17
Cracraft " .....	7
Harbledon and Hanson Islands .....	7
Stuart and Camp Islands .....	5
Gillford, Lorte, and Hardy Islands .....	5
Bartlett, Broughton, Bell, and Pearse Islands .....	5
Quatsino Sound .....	8
Barnard Passage .....	1
Dunsmuir District .....	28
Cameron Lake .....	10
Horne Lake .....	2
Nanoose District .....	1
Philipps Arm.....	92
Frederick Arm.....	22
Loughborough Inlet.....	22
Bute Inlet.....	4
Knight's Inlet.....	9
Jarvis Inlet.....	6
Theodosia Arm and Malaspina Inlet .....	29
Wellington District.....	3
Powell Lake .....	17
Ramsay Arm .....	8
Klaanch River .....	4
Seymour Narrows .....	12
Toba Inlet.....	2
Thompson Sound .....	15
Call Creek .....	3
Total.....	566



DETAIL OF PISTONS.

MORISON STAMP MILL—"DORATHA MORTON" MINE, PHILIPP'S ARM.



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VICTORIA DISTRICT.

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## VICTORIA MINING DIVISION

## MOUNT SICKER.

During November, the Provincial Mineralogist visited Mount Sicker for the purpose of investigating certain properties upon which it was reported important development work had been done.

The *Lenora* mine, owned by Hy. Smith, et al., is situated on Mount Sicker, on the south slope of the valley of the Chemainus River, and distant from Westholme, on the E. & N. Ry., some eight miles over a very fair waggon road built during this past year by the owners, with the assistance of the Government. The road, being new, is a little soft in places, but is down grade all the way from the mine to the railway and heavy teams were hauling over it with apparent ease.

As this property was reported on last year I shall confine myself to the actual development at the date of my visit.

On the surface, in a small ravine, there is a large outcropping of solid sulphide ore—iron and copper pyrites—as wide as 20 to 30 feet in one place, lying in a country rock of schist and shale cut by numerous dykes. This outcropping has been traced up the ravine and found to continue, more or less interruptedly, for several hundred feet, and enters into *Tyee* ground.

A tunnel has been run in to cut this outcropping ore-body at a depth, and was in some 370 feet, with various cross-cuts, etc. The mineral seems to be chiefly associated with two dykes, or possibly in two zones, about parallel, and running N. and S. with seemingly a dip to the east.

At a point in the tunnel, about 192 feet in from the mouth, a drift had been started off to the east for a few feet, and in this a winze had been sunk 100 feet, from which point a drift was being run to the west to cut at this lower level the ore-body found in the tunnel. This drift had been run some 100 feet, but though it cut through rock having the same characteristics as that enclosing the ore above, the continuation of the ore-body had not been found.

The ore met with in the tunnel was irregularly distributed through a greenish dyke, and assays, from samples taken from the dump, gave 5 to 10 % copper, 5 to 10 oz. in silver, and from \$5 to \$10 in gold. A trial shipment of some 20 or more tons was made this fall to one of the American smelters, but the returns have not yet been received.

The development, although considerable, has not as yet proved the size of the ore-body, nor has it been such as would warrant the prediction that the property will develop into a mine. At the same time, the large surface croppings and the ore met with in the workings give strong hope that further development will be satisfactory.

Steel rails have been laid in the tunnel and iron dump-cars were in use. About 8 men were employed in the mine.



A claim lying immediately above the *Lenora* and owned by Clermont Tyee Livingstone, et al., of Duncan's. As already stated, the ore-body found on the Mineral Claim. surface of the *Lenora* has been traced into this claim, and on this out-crop a shaft has been sunk at a point a few feet from the *Lenora* boundary. This shaft was so full of water that I could not examine it, but it is said to be down 50 feet.

A second shaft was sunk a few yards further up the hill with the evident intention of proving the continuation of the outcrop, but I am informed it was not successful.

The development on the *Tyee* amounts to very little, and any importance the claim may have is derived from the somewhat successful development in the *Lenora*.

It is reported that a company has been formed to float this property in England for a large sum. The scheme should be brought before the public as an undeveloped prospect with some promise—anything else would be premature.

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## VICTORIA MINING DIVISION.

REPORT BY W. S. GORE, GOLD COMMISSIONER.

The excitement consequent upon the discovery of the great northern gold-fields, and our position as a starting point therefor, has, during the past season, retarded the advancement of the mining interests of this Division, the majority of claim owners doing no more than the necessary annual assessment work.

### MOUNT SICKER.

Attention is being drawn to Mount Sicker, situated about 50 miles from Victoria on the E. and N. Ry. This mountain is of a diorite and schist formation, running nearly east and west, and very little broken as proved by tracing the bands of rock almost the entire length of the mountain. A great number of claims have been located in this section, and considerable assessment work has been recorded, some good prospects having been opened up, notably the *Tyee*, *Richard III*, *Copper Canyon*, *Fortuna*, *Queen Bee*, and *Lenora*.

*Tyee*—On this claim a shaft has been sunk a depth of 45 feet on a very promising looking reef of rock, carrying copper, gold, and silver.

*Richard III*.—This claim is situated on the same lead as the *Tyee*, and adjoins that claim on the east. A shaft has been sunk to a depth of 70 feet, through a small quantity of the same ore all the way down, but, as yet, the permanent ore-body has not been reached.

*Fortuna*—On this claim a tunnel has been run in a distance of some 130 feet and it is now reported to have cross-cut six or seven feet of copper ore.

*Queen Bee*—A tunnel has been driven on this property directly into the reef a distance of 65 feet. The ore is said to carry free-milling gold.

*Copper Canyon*—On this claim a tunnel has been run 100 feet alongside of a quartz reef, highly mineralized with copper pyrites. The width of the reef is 18 inches.

Considerable work has been done on this claim, consisting of a tunnel  
*Lenora*. driven 100 feet and cross-cutting two ore-bodies, one 12 feet, the other 6 feet, in width. On the north ore-body a drift has been run 300 feet. Two cross-cuts have been made, proving the parallel ore-body to the same distance. A shaft, now being sunk, has reached a depth of 70 feet below the tunnel, making in all about 600 feet of

work. A waggon road has been built, new buildings for men's quarters completed, an ore shed, 16 x 50 feet, finished, and a steel tramway laid the entire length of the drift, passing out through the ore shed. The rock from the mine is taken out in iron cars of the Truax pattern, of which two are now in operation.

A good deal of development work has been recorded on some of the claims in the vicinity of Goldstream, and the same might be said of claims situated on the San Juan and Gordon Rivers, in Renfrew district.

Placer mining has been carried on on the Sooke and Leach Rivers, and those interested think that with a further expenditure satisfactory results may be obtained.

#### OFFICE STATISTICS—VICTORIA DIVISION.

	1897.	1898.
Free Miners' Certificates issued .....	1,204	1,242
Mineral Claims recorded .....	772	392
Placer " .....	15	12
Certificates of Work issued .....	67	195
" Improvements issued .....	6	17
Grants of Water Rights for Mining .....	11	2
Lay overs .....	6	18
Placer Leases .....	34	..
Conveyances .....	130	115
Abandonments .....	..	8
Mill-site Leases .....	1	..

#### REVENUE DERIVED.

	1897.	1898.
Free Miners' Certificates .....	\$11,402 00	\$13,836 00
Mining Receipts, general .....	4,359 60	4,037 90
Total .....	\$15,761 60	\$17,873 90

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#### NEW WESTMINSTER MINING DIVISION.

##### REPORT BY D. ROBSON, MINING RECORDER.

I have the honour to report as follows on mining operations in the New Westminster Division during the year 1898. As this report is required before the end of the year, the statistics of mining business transacted at this office are made to cover only eleven months, and, for the purpose of proper comparison, the figures for 1897 cover only the first eleven months of that year:—

	1897.	1898.
Free Miners' Certificates issued .....	2,704	1,865
Mineral Claims recorded .....	1,878	316
Certificates of Work recorded .....	174	359
Conveyances recorded .....	295	98

Revenue from Free Miners' Certificates .....	\$21,889	\$15,367
Other mining revenues .....	5,957	2,762
Total mining revenues .....	\$27,846	\$18,129

(In the above amounts are included the Free Miners' Certificates issued at Vancouver.)

It will be seen that there has been a considerable falling off in every department of mining revenue, except in the fees for assessment work, and that a great many of the claims located in 1897 have been allowed to lapse. This was to be expected. The mining boom of 1897 influenced men without experience to locate claims where there was very little prospect of finding a paying mine. In many cases these locations were made in the hope of making a sale of the claim without the expenditure of any money thereon.

Among the claims in good standing, there are quite a number where the indications are entirely encouraging, but only on a small number has development work been done to any considerable extent. It is difficult to ascertain with any exactness the expenditure actually made on many of these claims, but from the best information at hand I estimate that there has been expended in development work in the Division during the year about \$75,000. On the following claims, the following sums (approximately) have been expended:—*Providence* (Harrison Lake), \$8,000; *Golden Crown* (Harrison Lake), \$1,500; *Money Spinner* (Fire Mountain), \$10,000; *White Star Group* (Douglas-Lillooet Road), \$4,000; *Fairplay* and *St. Alice* (near Agassiz), \$3,000; *Pitt Lake Group* (Pitt Lake), \$8,000.

The *Providence* mine has been purchased by the Providence Mining and Developing Company, the purchase price being stated as 1,200,000 shares at 25 cents, representing \$300,000. There are three veins on the claim, and considerable work has been done in developing it. This year a tunnel has been made in No. 1 vein, 31 feet, as well as a 92-foot shaft and a cross-cut of 37 feet. In No. 2 vein, an adit of 45 feet has been made. The amount expended on the mine this year is about \$8,000, exclusive of an expenditure of \$5,500 in new plant which is now on the ground. This includes a 4-drill Rand compressor. Three shipments of ore have been sent to the smelters at Tacoma and Everett, which gave returns of from \$20 to \$34 in gold and silver to the ton. There are about 165 tons of ore on the dump.

In a report on this mine, dated 14th October last, Mr. Fritz Cirkel, M.E., says of No. 1 vein: "It has all the characteristics of a fissure vein. It crosses the formation, and presents two well-defined walls." Mr. Cirkel concludes as follows: "In conclusion, I may say that, looking at the property just examined as a whole, the results so far obtained are of a very satisfactory nature, and should encourage further extensive development work."

The *Golden Crown* is an extension of the *Providence* claim, and is owned by Messrs. Trethewey, Fullbrook and Monteith. This claim has been bonded to the Golden Crown Syndicate for \$20,000. There are four veins on the claim, almost parallel to each other, within a distance of 400 feet. The syndicate has driven a tunnel, with the intention of cross-cutting these veins. This tunnel is 55 feet in length, and has reached the first vein. Assays of the ore have gone as high as \$32 to the ton in gold and silver. It is the intention of the syndicate to continue the tunnel until all the veins have been cut. The sum expended since the 8th of October, when the mine was bonded, is \$1,500.

The *Pitt Lake Group* consists of the *Champion*, *Cromwell*, *Rocket*, and *O. K.* claims. These four have been bonded this year to the Dominion Mining, Development, and Agency Company for \$65,000, and the Company

has expended on the mines about \$8,000. Only one vein has yet been defined on the property. It runs through the four claims, and has a width of about 6 feet, with well-defined walls. A tunnel, 300 feet, and a shaft, 140 feet, have been made this year. The total length of tunnelling done on the property to date is 450 feet, and of shafting 165 feet. Bin samples of the ore give assays of from 3 % to 21 % of copper, and \$3 to \$5 in gold and silver. There are now about 1,400 tons of ore on the dump. The owners of this property are very sanguine of results, and expect to continue work next year on a more extensive scale.

**Fire Mountain Group.** The *Fire Mountain Group*, owned by the Fire Mountain Gold Mining Company, consists of a number of claims, but the principal work has been done on the *Money Spinner*. Late last season a Huntington quartz mill was erected on this property, but the rock was found to be so extremely hard that it could not be crushed successfully by this machine without the aid of a crusher. The mill has not been operated during the past season. About 300 feet of tunnelling has been done this year, and the whole length of shafts and tunnels at the present date is about 600 feet. A horizontal tunnel has been run 450 feet into the mountain, and the ore is said to improve as the distance increases. The vein is about 4 feet in width, and is enclosed in serpentine walls. Assays are said to be quite satisfactory. The mouth of the tunnel is 5,100 feet above sea-level, and the property is covered with snow during six months of the year. About \$10,000 has been expended this year in development work, and if sufficient capital can be had next year it is the intention of the company to erect a large plant for treatment of the ore.

**White Star Group.** The *White Star Group* consists of five claims situated near the Douglas Lillooet Road, about 27 miles from Port Douglas. This property is owned by a company to be known as the White Star Company. A shaft, 40 feet, with cross-cuts, has been made this year, at a cost of about \$4,000, and assays have ranged from \$3 to \$70 per ton in gold and silver.

**Fairplay and St. Alice Claims.** The *Fairplay* and *St. Alice* claims are situated on the C. P. R., near Agassiz. These claims were formerly known as the *Fat Man* and *Nancy Jane*. This year, a tunnel, 180 feet, has been made, and two cross-cuts of 40 and 70 feet, respectively. The total length of tunnelling and cross-cutting on this property to date is about 400 feet. The expenditure this year has been \$3,000. The ore is chiefly copper, and is very refractory on account of the presence of a large percentage of zinc.

It is reported that a very large body of ore has been exposed on Seymour Creek, near Burrard Inlet, but particulars are not obtainable at the present date. Very rich samples of gold-bearing quartz have been taken out of the new mines located near the international boundary line, south of Chilliwack. Free gold is quite visible to the naked eye, but it is not possible now to determine the extent of the paying ore, as very little development has been done. A road is being constructed from Chilliwack to these mines.

It may be said, generally, that none of the mineral claims located in this Division have yet been proven, although there are several where the indications are most encouraging. The claims are mostly held by persons of small capital, and there is great need for additional capital for their development. The circumstances are such, I think, as to encourage the investment of capital in mining enterprises in this Division.

## SKEENA MINING DIVISION.

*(A Division of Cassiar District under the jurisdiction of Victoria Gold Commissioner.)*

REPORT BY JNO. FLEWIN, MINING RECORDER.

This Division, in common with the whole northern section, has, during the past year, witnessed a great rush of prospectors in search of both placer and mineral claims. Unfortunately, during the early part of the year, several expeditions were piloted into the district, notably into the Naas and Portland Inlet sections, in search of placer gold, by unprincipled parties, who had grossly misrepresented the possibilities of the country. The consequence, of course, was much individual hardship, and many injurious reports carried to the outside world by persons who had been led to believe that large fortunes awaited every one who chose to come here for them, and who, being disappointed in their expectations, went away disgusted with the whole country. Some individual members of the ill-fated Grider, Bridges and Abbot expeditions did some prospecting for placers in these sections, with little or no success. It was not to be expected that the result would be otherwise, as amongst upwards of one hundred and eighty men in these parties, there were not half a dozen practical miners.

The whole of the coast section of this district has been prospected by placer miners from the Omineca and Cassiar mines, and all came to the conclusion, long since, that no placer ground existed on the coast where gold might be found in paying quantities. In the interior section of the district, as far as known, there is no placer ground, which can, by any possibility be considered "poor men's diggings." On Lorne, and other creeks emptying into Skeena River above the canyon, as also on the Upper Naas River, there are several propositions which, it is believed by experienced men, will eventually pay well to hydraulic, as well as some very good dredging ground.

Last month the representative of a syndicate of Victorians located some abandoned ground on Lorne Creek for hydraulic purposes, for which they are applying for a lease. It is also the intention of the same parties, if they obtain their lease, to purchase the *Dry Hill* placer claim on the same creek. This ground has been worked for years with indifferent success, the great difficulty apparently being for a company of miners with very limited means to get water on the claim in sufficient quantity to make it pay.

A great deal of prospecting for mineral claims in this hitherto neglected section has been carried on, and the outlook for a lot of development work during the coming year is very promising.

Early in the year two or three parties went in to Kish-ga-gas, which is situated on the Upper Skeena, sixty miles north of Hazelton, on the Bear Lake trail. They succeeded in locating some very good looking ledges, carrying gold, silver and copper, assay values running as high as two hundred dollars per ton. Twelve claims were recorded for that section in this office, and I believe some more with Deputy Recorder Sargent, at Hazelton, from whom I have received no report as yet. It is the intention of the locators, who represent New York capitalists, to take in a party of sixty men early in the spring to do the necessary development work. I anticipate, from the reports I have heard from these men, that this will be a very important camp in the near future.

On the Buckley River, which is the main tributary of the Skeena, emptying into it near Hazelton, some prospecting has been done and a few locations made. The ore found here is copper-gold, the formation being diorite and slate, and the country being an unusually easy one to traverse. The valley of this river is well adapted for farming and stock-raising.

For upwards of one hundred miles south from Hazelton there is a beautiful valley from one to four miles wide, the soil of which, a rich black loam, averaging five feet in depth, is covered with a rank growth of wild grasses, raspberries and strawberries. The Indians here never feed their horses in winter; they are turned out to shift for themselves, and come out in good condition in the spring. The Hudson Bay Company are wintering some of their pack animals from Omineca in this valley this winter. On the smaller tributaries of the Buckley there are several very promising-looking seams of coal.

Descending the Skeena to the Kitsalas Canyon, eighty miles from the mouth of the river, several good ledges carrying copper, gold and silver have been discovered. C. W. D. Clifford, M.P.P., was the first locator here in 1893. He located three claims, now owned by the Skeena River Gold Mining Company, on which the assessment work has been completed and the Crown grants issued. On these claims—the *Emma*, *I.X.L.*, and *Bootjack*—the company have run a tunnel one hundred and sixty-five feet, all in good ore, and have also sunk a shaft forty-five feet. During the past season twelve claims have been recorded in this camp, the assays showing very well, one which I was shown, made by Mr. J. R. Cowell, giving sixty dollars in gold, thirty dollars in silver and ninety dollars in copper per ton. From information which I have received, I quite expect there will be from two to three hundred men in this camp next season.

The greatest drawback to the Skeena section is the want of proper communication and transportation facilities with the Coast. The only means of access to the country, at the present time, is by the Hudson Bay Company's steamer which makes four or five trips per season up the Skeena River at irregular intervals, or by canoe, both being expensive ways of travelling. A very easy route to the whole of this section, and also to the Omineca country, offers by way of the magnificent Kitamaat Valley; a road which can be very easily built, and which, for a comparatively small outlay, will open up a country rich in mineral, agricultural and grazing resources.

The only other discoveries which have been made during the season are some of low grade copper-gold ores in very large bodies immediately on deep water and of easy access on the Hastings Arm of Observatory Inlet, on which five locations were made this Fall, but on which no assessment work has been done. In this camp, also, one ledge was discovered which showed, in addition to gold and silver values, twenty-two ounces of molybdenite per ton, the first of this mineral to be discovered in this section.

#### OFFICE STATISTICS—SKEENA DIVISION.

Free Miners' Certificates .....	92
Mineral Claims Recorded .....	31
Certificates of Work .....	9
Conveyances Recorded .....	22
Revenue from Free Miners' Certificates .....	\$460 00
Revenue from other sources .....	155 00

Total.....\$615 00

This does not include Hazelton sub-division, from which I have received no report, but which will probably produce about two hundred dollars more.

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**REPORT OF INSPECTOR OF METALLIFEROUS MINES.**

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The following reports for the year 1898, have been received from the Inspectors of Metalliferous Mines, Messrs. Macdonald and McGregor. Mr. McGregor's appointment dates only from the month of July, his report covering the period following his predecessor's retirement.

**REPORT OF D. J. MACDONALD, INSPECTOR.**

I have the honour to submit the following brief report on the condition in which I found the mines examined by me in the Nelson and Slocan Districts.

This mine, situated on Toad Mountain, nine miles from Nelson, B. C.,  
**Hall Mine** is worked by means of tunnels. These are four in number, all connected  
(Silver King). by winzes and upraises providing ample ventilation. The lower tunnel, No. 4, taps the ledge at a depth of about 600 feet. The present workings lie between tunnels No. 2 and No. 4, and upon examination I found them to be in a good, safe and workmanlike condition, well timbered throughout with square sets of timbers 12 inches by 12 inches. The stopes and passage ways have all been well timbered and, upon removal of the ore, have been well filled in with refuse, providing a safe precaution against caving. The ladder-ways also are in a safe condition.

The powder magazine is situated several hundred feet, a safe distance, from the mine, and is in charge of one man. Only sufficient powder is admitted into the mine to last for one day's supply.

There are employed in and around the mine 160 men, under the management of M. S. Davis. The quarters provided for the employees, as regards comfort and health, are of the very best, comprising a very large and comfortable boarding-house with all conveniences. The management of the mine is excellent, and the workings such that ordinary care used by the individual employees should prevent accidents of a serious nature.

Situated ten miles from Nelson and three miles from Hall's Siding, on  
**Fern Mine,** the Nelson and Fort Sheppard Railway. It is worked by means of two tunnels, the lower tapping the ledge at a depth of about 200 feet.

The opening of the mine has been done in rather a rough manner, but the workings are not as yet very extensive, and the character of the ledge is such—the walls being of solid and firm material—that it is reasonably safe.

The powder was being kept in a drift in the mine, but the manager promised in the future to keep it stored in a safer place and at a proper distance.

There are 16 men employed. The ore is conveyed to the mill by a surface gravity tramway. The mill is operated by steam power and is provided with the necessary appliances for prevention of fire. The whole is under the management of J. A. Veach.

Situated 1½ miles north of Whitewater, on the Kaslo and Slocan Rail-  
**Whitewater Mine,** way. This mine is worked through tunnels, five in number, the lowest tapping the ore at about 480 feet from the surface.

The ledge on this mine is very large, containing very soft material surrounded by heavy ground. The workings are timbered with squared sets, 12 inches by 12 inches, and while up to the present everything appeared in a good and safe condition, great care should be exercised



"MARBLE BAY" SHAFT HOUSE - TEXADA ISLAND.



175 FT. LEVEL IN "VAN ANDA" MINE--TEXADA ISLAND.





in properly refilling the stopes and seeing that every portion is properly supported as the work progresses. Upon attention being called to this, the management promised that it should be carefully attended to. Proper connections have been made between the various levels to supply ventilation.

Very little powder has to be used on account of the softness of the ledge matter, and the magazine is situated at a safe distance from the workings.

The quarters for the employees are well provided and comfortable. There are 108 men employed, under the management of I. C. Eaton.

Situated on Payne Mountain, 4 miles by road from Sandon. This  
**Payne Mine,** mine is also worked by means of five tunnels, the three upper being driven on the ledge, well timbered, and so connected as to give ample ventilation. The size of the ledge is such that it is necessary in stoping to remove a good portion of the wall matter, which is immediately filled in to replace the vacancy caused by the removal of the ore. This does away with much timbering, and there is never at any one time any large open chamber which would give cause for fear of a cave-in. Very little powder is necessary in the mining.

There are 85 men employed, under the management of Mr. Scott McDonald, and the boarding-house and quarters are very comfortable.

Situated near Sandon. This mine is worked by means of tunnels, well  
**Ruth Mine,** timbered with square sets, and so connected as to provide thorough ventilation. The stopes are safely supported by stulls. The powder magazine is situated at a safe distance from the mine, and the whole management good and thorough and in compliance with the Act. There are 55 men employed, under the management of Mr. H. B. Alexander.

Situated near Sandon. This mine is operated by means of five tunnels.  
**Slocan Star,** The ledge is very large and the workings have been very imperfectly timbered, so much so that they have had a "cave in" between tunnels No. 2 and No. 3, necessitating a complete suspension of work above the latter.

All the stopes have been timbered with stulls merely and no filling done at all, making the workings actually dangerous if continued under the present system. Work had been commenced in re-timbering the mine below No. 3 tunnel with square sets, and I impressed upon the Superintendent the necessity of thoroughly filling in behind the sets as the work progressed.

During my visit the operations were merely re-timbering and developing, the mill having been closed down. There were about thirty men employed, under the management of Mr. Bruce White. The ventilation is good and the powder magazine safely situated. Much cannot be said as to the comfort or conveniences provided for the men, as they are not of the best.

Situated about 6 miles south-west of Three Forks. This was a very  
**Idaho Mine,** hard mine to get at, on account of the numerous snow slides. It is being worked by means of tunnels, five in number. Under the former management, the work had been very carelessly done, but the present management is filling in the old stopes and timbering with square sets, and should in a short while have it in a safe condition. The ventilation is good, through proper connections.

The powder magazine is situated in a safe place, and kept in accordance with the requirements of the Act.

New and commodious quarters have lately been built for the employees, 70 in number, under the management of Mr. Geo. Hughes, under whom all requirements as to the safety of the employees are being attended to.

Situate about 4 miles from Three Forks. It is worked by means of Queen Bess, tunnels, three in number, well timbered. Very little stoping has been done as yet, but the character of the ledge is such that great care will have to be taken as the work progresses. So far, it is in a safe condition.

There are 65 men employed, and their quarters are only temporary. The mine is under the management of Mr. R. W. Rathbone.

Situated on Four-Mile Creek, 6 miles by waggon road from the town of Vancouver, Silverton. This mine is under development. There are two tunnels, well timbered where necessary, very little stoping done, but all the work is being conducted in a safe and workmanlike manner. There are 25 men employed, under the foremanship of Wm. Lewis.

Situate 2 miles from the town of Silverton. This mine is being worked Galena Farm, by means of two perpendicular shafts, one being 50 feet in depth, and the other 212 feet. The latter is the working shaft, in two compartments, well timbered, one being a man-way with ladders from top to bottom, and the other the working compartment. The hoist is worked by water-power, and the cage is equipped with the proper "safeties," all in accordance with the requirements of the Act. Connections have been made between the two shafts, affording ample ventilation. Cross-cuts and drifts have been driven from the 100-foot and 200-foot levels, and the rock is of such a hard character that very little timbering is necessary.

The quarters provided for the employees are very commodious and excellent. There are employed about 25 men, under the management of Mr. G. R. Fraser.

The above comprise the principal mines inspected by me in the Nelson and Slocan Divisions. A few of the smaller ones were likewise visited, but, as very little work had been done, nothing definite can be said as yet. Several of the other large mines should have been visited, such as the *Reco*, *Last Chance*, *Goodenough*, *Cariboo-Rambler*, and many others, but the snow and condition of the weather was such as to make it actually dangerous to get to them at the time of my visit to the locality.

#### REPORT OF JAS. MCGREGOR, INSPECTOR.

I have the honour to submit my first report as Inspector of Mines for the Province of British Columbia. I was appointed on the 8th of July last, and, pursuant to instructions, proceeded to Rossland on the 12th day of July following. Subsequently, I paid official visits to a number of mines in the Kootenay District, Texada Island and Alberni.

The first mine visited was the *Iron Mask* at Rossland, on the 20th of July. Here I found 22 men at work. The main tunnel is 100 feet in depth and connected with the *War Eagle* mine, and by winze with the *Centre Star*. From the main tunnel, a shaft 176 feet has been sunk. From the lower levels there is a tunnel to the east of 35 feet, and to the west 150 feet. The output of this mine is about 300 tons per month. The ladder-ways and shafts I found without landings in contravention of the Act. This defect the manager promised to remedy without delay. The motive power of this mine is furnished by the *War Eagle* Company.

I visited this mine on July 22nd, and found 30 men at work. The *Centre Star*. output is about 1,500 tons per month. The mine is connected with the surface by three shafts and two tunnels, and is also connected with the *Le Roi* mine. I found the ventilation in the mine about 6,780 cubic feet per minute. I also

ascertained that no powder was being stored in the mine. The motive power is compressed air. There is about 6,000 feet of tunneling in all.

**Nickel Plate Mine.** I visited this mine on July 21st and found 15 men employed underground. Depth of shaft 200 feet. I found the ladder-ways and shafts in good condition. The mine is connected with the surface at the 100-foot level. Workings I found well timbered wherever necessary.

**Great Western Mine.** I visited this mine on July 24th. Fourteen men employed underground. Shaft down 200 feet. Pumps run by steam and the drills by compressed air. The tunnel has been driven to connect with the surface at 100 feet from the main shaft. The timbering in the mine, where necessary, was well done, and the ladder-ways were found in good condition.

**War Eagle Mine.** I visited this mine on July 23rd and found 225 men employed, and the ventilation to be 7,200 cubic feet per minute. The output is about 180 tons daily. The mine is open to the surface in seven different places. The motive power is compressed air. I regret to say that the last lift, the "travelling-way," in my opinion, is unsafe. I drew the attention of the management to this fact, and it was promised that the defect would be remedied immediately. I also visited the open shaft on the hillside, and this the manager promised to put in safe condition for travelling and as a means of exit.

**Columbia and Kootenay Mine.** I visited this mine on July 25th. I found 20 men employed and the mine worked by three tunnels. I found the mine in splendid condition, and the ventilation to be 12,250 cubic feet per minute. The main tunnel was in about 300 feet. The timbering, where necessary, was well done.

**Josie Mine.** I visited this mine on July 25th. I found there an inclined shaft with ladder-ways, but without landings the full distance; the ladders were very substantial. I ascertained from the manager that the ladder-ways were not at any time used by the workmen as a means of communication with the surface. No powder is stored in the mine and only the exact amount required is sent down at any one time. The shaft is well timbered and the ladder-ways well protected from the shaft. There is an outlet at 100 feet by a tunnel to the surface. There are tunnels from the bottom of the main shaft 200 and 300 feet to the right and left respectively. Thirty-five men are employed.

**White Bear Mine.** On July 26th I visited this mine. Here I found a vertical shaft of 195 feet without levels. I found this shaft well timbered. I noticed that when the bucket arrived at the surface the doors closed over the shaft while the bucket was being discharged. The ladder-ways I found without landings, such as the Act calls for, owing to the shaft being too small for ventilation purposes, if the travelling compartments are closed in and it is worked by compressed air. All shots are fired by a battery from the surface.

**Sunset No. 2.** I visited this mine on July 28th. The shaft is 340 feet in depth. At 108 feet from the surface there is a tunnel of 310 feet to the surface for ventilation purposes. Only 6 men were working. In this shaft the miners always ride on the bucket. I found the shaft well timbered and well protected.

**Deer Park Mine.** I visited this mine on July 28th. The shaft is vertical and down 270 feet. There are compartments for air and ladder-ways. The first 100 feet of the ladder-way was without landings. I drew the attention of the management to the fact that they were not complying with the Act, and they promised to immediately remedy the defect. The miners here also ride on the bucket entirely and do not

use the ladder-way. I also drew the manager's attention to the fact that according to the Act it was necessary to connect with the surface. This he promised to do immediately. I received no complaints from the miners in this mine.

I visited this mine on August 4th. I found 45 men employed and  
**Athabasca Mine.** the tunnel driven in 400 feet. Ventilation is good, the ventilating power being a steam jet in the shaft. The shaft is very well timbered and well protected from the travelling way.

I visited this mine on August 5th. There are here 180 men employed,  
**Silver King Mine.** of which 130 are underground. The lower tunnel is the working tunnel, the length of which is 1,800 feet. No. 4 tunnel is being driven to connect with a shaft on the *Kootenay Bonanza* claim at 300 feet depth. I learned it was their intention to connect with the surface at 100 feet for ventilation purposes. I found a great amount of work has been done by stoping. The ventilation in this mine is natural except in close drifts where the ventilation is by fan. The timbering was in good condition and well done, and the ladder-ways perfectly safe.

I visited this mine on August the 8th. It is operated by tunnels. A  
**Poorman Mine.** large amount of development work has been done, and the management considered it expedient to drive a tunnel at a lower depth; this depth I found to be about 500 feet.

I visited this mine on August 9th, and found 21 men employed. The  
**Ymir Mine.** mine is worked by three tunnels, Nos. 1, 2 and 3, of which No. 1 is in 500 feet; No. 2, 800 feet; and No. 3, 375 feet. The ventilation is natural, but at times a compressed air blast is used in No. 3 tunnel. Work is at present confined to tunnels No. 2 and No. 3. The latter I found down 66 feet, which leaves 34 feet yet to go before connecting. I found here, that the powder was stored in the mine. I drew the attention of the manager to this fact, and he stated that the matter would be remedied at once.

I visited this mine on August 11th, and found about 60 men at work.  
**Whitewater Mine.** The mine is principally worked by tunnels, and the ventilating is done by furnace and air pipes; the amount of ventilation being 13,800 cubic feet per minute. I found in this mine that it was very difficult to keep the main tunnel in good shape owing to side pressure, due to the presence of lime in the ore. Of late they have changed the system of driving tunnels, and are now carrying them to the foot-wall, since then there is no pressure noticeable. The management have been constantly moving timbers, replacing them by new ones, and still continue to do so—a method of procedure which keeps the tunnel safe.

I visited this mine on August 14th, and found about 100 men employed.  
**Slocan Star Mine.** The mine is worked by five tunnels connected by winzes and ladder-ways leading from one tunnel to the other, and these are not used by the workmen as travelling-ways. The motive power is compressed air.

I visited this mine on August 15th, and found 60 men employed. The  
**Ruth Mine.** mine is worked by six tunnels. All of these are working, and four of them are connected together by winzes. No. 1 tunnel is 600 feet in length; No. 2, 1,500 feet; No. 3, 100 feet, and No. 4, 600 feet, the last-mentioned being ventilated by water blast. The number of men employed underground is 40. I found powder stored in the mine, and called the attention of the management to the provisions of the Act in this regard. This mine is worked by compressed air power. I found the natural ventilation to be 13,440 cubic feet per minute. The shaft is well timbered.

I visited this mine on August 17th. Mine is worked by three tunnels. No. 1, I found in 600 feet, No. 2, 800 feet, and No. 3, 120 feet. Nos. 1 and 2 are connected by shaft, and No. 1 is connected with the surface, making an outlet from No. 2. In this mine, 9 men are employed, and the ventilation is natural, amounting to 6,000 cubic feet per minute. The timbering in this mine is well done, and in a very safe condition.

I visited this mine on the 18th of August. I found 22 men employed. Ventilation, 16,200 cubic feet per minute. The mine is worked by nine tunnels, and connected with the surface by upraises. There is about 120 feet between tunnels. The mine is worked by compressed air. Where necessary, the timbering is well done, and no danger exists for the workmen.

I visited this mine on August 18th, and found 20 men employed. The mine is worked by four tunnels, of which No. 3 is connected to No. 4 level by winzes, in which the air travels from the surface through stopes, which are overhead, and returns by No. 4 tunnel. I found the ladder-ways in this mine unused by the workmen, and in very good condition.

I visited this mine August 20th, and found it worked by one tunnel, with 7 men employed. The shaft was only down 7 feet, but they intend, for ventilating purposes, to sink 250 feet.

I visited this mine on 20th of August, and found it worked by four tunnels, with 25 men employed underground. Ventilation by water blasts. Owing to the peculiar nature of the ground, it has required considerable timbering. I found this well done where necessary. This mine is connected from No. 1 tunnel to No. 3 to the surface, and from No. 3 tunnel to No. 4 tunnel it is connected by the main tunnel for ventilation purposes.

I visited this mine on August 21st, and found it closed down. Would be worked through tunnels if in operation.

I visited this mine on the 22nd of August, and found 18 men employed. The mine was worked by seven tunnels. Ventilation, 2,250 cubic feet per minute, was effected by water blast.

I examined this mine on August 23rd, and found 60 men working and ventilation 5,760 cubic feet per minute. The mine is worked by eight tunnels. No. 1 is driven in 120 feet; No. 2, 400 feet; No. 3, 500 feet; No. 4, 700 feet; No. 5, 400 feet; No. 6, 120 feet; No. 7, 450 feet; and No. 8, 120 feet. All the tunnels connect one with the other at no greater distance than 120 feet apart. At no time do the management intend to go over 150 feet before making a connection. The timbering of this mine, where necessary, I found very well done.

I visited this mine on August 24th, and found 14 men employed. The mine is worked by three tunnels: No. 1 tunnel, 880 feet; No. 2, 1,000 feet; No. 3, 750 feet. Ventilation is natural. Considerable stoping has been done. After moving the material, the stopes are filled in, the timbers not being removed. The timbering, where required, was well done.

I visited this mine on the 24th of August, and found 12 men employed. Ventilation was natural, and amounted to 8,400 cubic feet per minute. The mine is worked by four tunnels, which connect with the *Idaho* mine. They are also filling stopes. I found the timbering, where such was necessary, quite safe.

I visited this mine on the 25th of August, and found the mine worked by a vertical shaft, which was in good condition and well protected throughout. There were only 4 men working. The amount of ventilation was 1,170 cubic feet. The mine was connected with the surface at 100 feet by an air shaft provided with a ladder-way, also a ladder-way and hoisting shaft. The presence of carbonic acid gas was to be detected in this mine, which renders necessary a greater amount of ventilation than there is at present. The full depth of the shaft was 200 feet, but the workings were not in progress of development when I was there.

I visited this mine on September 17th, and found 16 men employed underground. The mine is operated by an inclined shaft of a depth of 65 feet, and worked by hand drilling. Hoisting is done by a windlass, there being no machinery for the purpose. I found the ventilation good.

I visited this mine September 29th, and found it was worked by a shaft 100 feet in depth. Ladder-ways throughout, protected from hoisting shaft, and landings, in conformity with the Act, every 20 feet. I found 9 men employed underground in this shaft. No provision of the Act contravened.

I visited this mine on September 30th, and found 25 men employed underground. The mine is worked by hand drilling. I found here a vertical shaft, 250 feet deep, timbered throughout, and the ladder-ways well protected from the hoisting compartment. There were two outlets to this mine, which I inspected, and found the ladder-ways in good condition.

In October, 1898, I visited Bridge River and Kamloops Divisions. There are a number of mining properties in these Divisions, but no development work of any description is being done.

I visited this property, November 12th. Three tunnels have been driven, none of which were working at the time of my visit. No. 1 extended a distance of 280 feet; No. 2, 250 feet, and No. 3, 530 feet. The company were preparing to start stopes, 75 feet from the surface. The up-raise from No. 3 to No. 2 drifts was up 70 feet. I found the mine well timbered and in fairly good condition.

Six miles from Lytton. The tunnel on this property has been driven a distance of 200 feet. It has been well and securely timbered a distance of 100 feet. The balance of the tunnel was through hard rock which did not require timbering. At the time of my visit six men were employed.

#### CASUALTIES.

The casualties (for the number of men employed) in the metalliferous mines have been comparatively light. From July 14th until this date, December 28th, there have been six fatal cases and one other reported accident, resulting in injuries to one man. Following are the details:—

On June 5th, 1898, Victor Engstein was killed at the *Cariboo* mine, Camp McKinney. The deceased was employed in running a car in the lower drift, at a depth of 275 feet, and had given the usual signals, meaning "man aboard," he bringing with him a number of drills. The hoisting was done slowly and it is presumed that in ascending the shaft the drills had over-lapped and caught on a projection at the 80-foot station, upsetting the car and precipitating Engstein to the bottom of the shaft, where his dead body was subsequently found. This was not reported to me until July 18th, and no inquest was held.

July 18th, 1898.—An accident in the *Snow Shoe* mine, Greenwood, resulted fatally to Hugh O. Thomas. While hoisting steel from the drift station the bucket became detached and fell to the bottom of the shaft, striking deceased, who was engaged in sinking, causing his death. No inquest was held, the Coroner, who arrived on the ground a few minutes after the accident, not deeming it necessary.

September 21st, 1898.—Edward Johnson, foreman of the *Kootenay-Bonanza* shaft, the property of the Hall Mines, Limited, was killed in the shaft by falling off the ascending bucket, a distance of only six feet. An inquest was held, and a verdict of accidental death returned.

On November 1st, 1898, at *Sunset No. II.* mine, Rossland, Joseph Cain and Patrick Nolan died from the effects of gas poisoning. An inquest was held, and from the evidence given before the Coroner and the circumstances of the case, I deemed it necessary to issue instructions for closing down the mine until it could be put in a safe condition.

November 10th, 1898.—At *Porto Rico*, A. Knowlton met with his death under somewhat peculiar circumstances. Deceased was engaged with another workman in driving a raise from No. 3 to No. 2 tunnels; after blasting, the two men returned to the face and were overcome by gas; both descended, heading for the mouth of the tunnel. Deceased, in his dazed condition, walked in and was found dead at the bottom, his face in the water.

On September 1st, 1898, Fred Snyder sustained a fracture of his leg in the *Enterprise* mine, Slocan Lake. He undertook to bring down some loose ore after a blast, against the wish of his partner, when the mass fell on him and caused the injury mentioned. He was removed to the hospital and recovered in due course.

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## COAL MINING IN THE PROVINCE.

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While coal mining as a practical commercial operation has as yet been confined to the various collieries operating on the east coast of Vancouver Island, and to the Crow's Nest collieries on the western slope of the Rockies, workable coal has been already discovered, and has received more or less development, in various other sections of the Province, its occurrence being widely distributed.

In most instances, these isolated discoveries have been made at points so far removed from railway accommodation—present or prospective—that little encouragement has been offered for serious development, and they are here referred to simply to demonstrate the possibilities of the various sections of the country when opened up by lines of transportation.

Starting at the Rocky Mountains, the eastern boundary of the Province. **Rocky Mountains.** This range from the U.S. boundary, northward, has been for miles proven to be coal-bearing, and enormous areas of the known coal fields have already been sufficiently developed to establish their value. While a large part of the known and more accessible portions of this area are now held by the Crow's Nest Pass Coal Company, there remain portions of it still unclaimed, and there is every reason to believe that future prospecting will prove the possibly productive area to be practically of unlimited extent.



An account of this coal field was given by Dr. Selwyn in the Report of the Dominion Geological Survey for 1891, written at a time when little more than prospecting and no development had been done. A somewhat detailed account of that portion of the field operated by the Crow's Nest Collieries will have been found in previous pages of this Report.

That the coal in the Rockies extends still further northward, for a considerable distance, is evidenced by the now producing mines near Banff, on the C. P. Ry., though these are on the eastern slope, and consequently not in this Province.

Seams of "good bright coal," varying in thickness from 6 inches to 2 feet, were observed by Dr. Selwyn at various points in the Peace River basin, near the eastern boundary of Cariboo District, more especially at the head of the canyon on Peace River, Hudson's Hope, and on Pine River, near Table Mountain. Concerning these observations, Dr. Selwyn says, "only one of these can be considered of any economic value, but it is quite likely that there are others in the region which were not observed by us."

Continuing still further northward, and to the west, coal is again met with in the Omenica District, but so far from a market as to be at present of little commercial value. I am informed by Mr. F. W. Valteau, the Gold Commissioner of this District, that coal has been recently found some 8 or 10 miles south of the Omenica River where it flows into the Peace River, and to quote from his description "it breaks with a conchoidal fracture; I have lit pieces of it in the flame of a candle and it continues to burn with a smoky flame, leaving little ash."

This would indicate a cannel coal or some other of the hydro-carbons high in volatile matter.

Mr. Valteau also informs me that workable seams of coal occur in the Buckley and Babine River valleys and intervening country, several of which seams he has personally seen. Some practical coal miners prospecting in this region took some of the coal found there down to Nanaimo, where it was reported as having good caking properties.

Proceeding westward, coal has been found in the valley of the Skeena River in various places, and is said to have been found in workable seams. But little development has been done, and the accounts are not very definite as to the results obtained.

Again proceeding westward from the mouth of the Skeena River to Graham Island, one of the Queen Charlotte Group. Here anthracite, as well as bituminous coal, has been for many years known to occur in considerable quantity, which deposits have been the subject of Reports by the Geological Survey in 1872-3 by Mr. Richardson, and again in 1878-9 by Dr. G. M. Dawson.

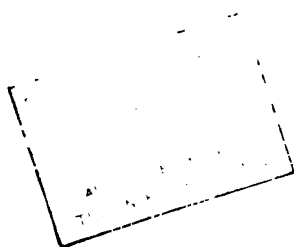
The Queen Charlotte Coal Mining Company, Limited, spent a large sum of money in the development of their property near Skidegate Inlet, but abandoned the enterprise in 1872.

According to the best information obtainable, the coal, when first opened up, was from 2 to 3 feet thick, of good clean anthracite, and as the tunnel progressed the seam widened to 6 feet, but further in decreased again until it was 1 foot 6 inches at the face, at which point work was stopped.

In 1892, Mr. H. E. Parrish, C.E. and M. E., late of the staff of the Geological Survey of the State of Pennsylvania, acting on behalf of Messrs. W. A. Robertson, Wm. Wilson, and others, of Victoria, made an examination of certain coal areas on this Island, held by these gentlemen, and situated to the westward over the mountain range from the property of the



TOWN OF FERNIE—NEAR CROW'S NEST COLLIERIES, S. E. K.



previously mentioned company. From Mr. Parrish's report of his season's work I have taken the following information :—

Camp Robertson.—Section 20, township 5, on a creek off the Yakoun River. Bed No. 1, Yakoun, 19 feet thick, bed dips vertically at surface ; shaft sunk 23 feet, at foot of shaft dip was only about 5° to E., strike N. and S. "This coal is, in my opinion, as fine a caking coal as the Connelsville bed in Pennsylvania."

About 60 feet east of No. 1, and overlaying it, is the outcropping of seam No. 2 ; shaft sunk 14 feet ; drift to N., 9 feet ; thickness of bed, 14 feet 8 inches.

No. 3 seam, overlaying No. 2, 7½ feet clean coal more bituminous than the two preceding seams.

Camp Anthracite.—Section 17, township 5. Shaft sunk 39 feet ; thickness at bottom of shaft, 10 feet ; strike regular, dip vertical at surface, changing to 45° to E. at bottom of shaft.

Camp Wilson.—Section 36, township 9, about 9 miles from Camp Robertson. Dip of bed at surface is vertical, but changes in depth attained to 60° to E. Shaft down 17 feet, with drift 23 feet to S. At the face the bed is 17 feet 8 inches thick, with one bench of 14 feet clean coal. This coal is of a later formation than that found at Camp Robertson. It is a very free burning bituminous coal, leaving little ash.

Mr. Parrish mentions other seams and their development, but these I have noted are quite sufficient to show the importance of the deposits in question.

I shall further quote a portion of his remarks as to the condition of the measures and coal outcrops :—

"From exposures and working it is evident that once we get below the surface the formation is regular and broken at no point. It flattens off with depth and takes a moderate dip to the east and north-east.

"Your property is well to the east of the volcanic eruptions which have broken up the measures on the south-west shore of Skidegate Inlet and the West Coast of the Island.

"One of the strongest indications I could find of the measures flattening as we get under cover, is on the creek about one mile south of Camp Robertson, and one-half mile east of the trail. At this point there is a water-fall with a drop of about 80 feet, over a fine-grained blue sandstone formation, lying in seams about 2 feet in thickness. The upper seams have a heavy dip, which gradually lightens off until at the bottom the dip is very slight towards the east. This is the largest exposure I could find on the property. Another strong indication is the tunnel I drove at Camp Robertson. You will notice on the plan that this starts on a level with the Yakoun River, and is driven towards the east into the hill a distance of 89 feet. The face is underneath the plateau upon which Camp Robertson is situated. The measures cut dip about 5° east, and at all the openings that were made show the dip to be heavy at the surface and gradually flattening as they got under cover. All the exposures I could find show there are no serious eruptions east of the mountains of the West Coast, and certainly none on the property I explored.

\* \* \* \* \*

"Conclusion—With the knowledge I have of the coal regions of Pennsylvania, acquired there as a Mining Engineer, and on the Geological Staff of that State, it must gratify you to know that in my judgment you have the best coal field I have seen. Until I visited it, I had no conception such a valuable field existed on the Pacific Coast. You possess a number of beds of unusual thickness, containing coals of superior quality, suitable for all requirements. You have anthracite, first-class steam, gas and caking coals, and a bed over 15 feet thick, excellent for domestic purposes."

The East Coast of the Island has so many producing collieries, having Vancouver Island. a joint yearly output of over a million tons, that mention of the district here is scarcely necessary, further than to refer the reader to the Report by the Inspector of Coal Mines, on the working collieries, which follows.

On the North-West Coast, near Quatsino Sound, coal has for years been known to exist, this area having been reported on by the geological survey in 1868, and again by Dr. G. M. Dawson, in the Survey Report for 1886.

Seams of coal, 4 feet thick, were then reported and some little development work done, but this was later discontinued.

In 1897, the West Vancouver Commercial Company began development of certain areas in this district and is reported as having met with considerable success, and to be now sinking a shaft on a 5-foot seam, with some hundreds of tons of coal on the dump. Some 12 men are employed in this development work, and a steam hoist and other machinery have been erected.

The coal measures also occur and have been somewhat prospected at Alert Bay on the North-East Coast, at Sooke on the southern end of the Island, and at several points on the West Coast of the Mainland opposite the Island, but so far none of the discoveries have received development sufficient to show their value.

At Sahquash, between Port McNeill and Alert Bay, some boring has been done and a 5-foot seam is reported as having been struck. The property is now under bond to an English company.

Discoveries of coal have been made in the Valley of the Fraser River.

**Fraser Valley.** The seams so far reported have been too small for profitable working, but sufficient to stimulate prospecting of a serious character.

Coal also occurs in the Valley of the Nicola River, a tributary of the Thompson, and seams up to 2 feet thick have been exposed. At Vermilion Cliff, lignite has been found in seams of from 2 to 4 feet, and a few tons of the surface coal taken out. (*See Report of Geological Survey 1887-8, by Dr. G. M. Dawson.*)

Still further to the south, coal has been exposed and somewhat developed in the Valley of the Kettle River, seams of 4 feet of good coal being reported; an account of which coal measures, by S. S. Fowler, A.B. & E.M., was included in the Report of this Department for 1896.

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## REPORT ON THE INSPECTION OF COAL MINES.

BY THOMAS MORGAN, INSPECTOR.

I have the honour, as Inspector of Coal Mines, to respectfully present, in accordance with the "Coal Mines Regulation Act" of the Province, my report for the year ending 31st December, 1898. My appointment as Inspector dating only from the 1st of November, my examinations have been confined to the mines of the Nanaimo and Comox Districts.

The Colliery Returns from Vancouver Island, in the aggregate, are indicative of a substantial progress in the coal mining industry of the Province during the past twelve months, and the increased output of the mines, together with larger sales, both domestic and foreign, evidence the fact that our collieries are more than holding their own, notwithstanding the keen competition for trade.

Coal mining operations have been carried on during the year by the following companies and firms :—

The New Vancouver Coal Mining and Land Company, Limited, has Nanaimo Colliery. worked the Nanaimo Colliery, consisting of No. 1 Shaft, Esplanade, in the City of Nanaimo ; Protection Island Shaft, No. 5 Shaft, Southfield, near Nanaimo River ; and in the Wellington District has done some pumping in the Northfield Shaft.

Wellington Colliery. Messrs. R. Dunsmuir and Sons have operated their Wellington colliery, consisting of No. 1 Shaft, near Departure Bay ; and shafts Nos. 3, 4, 5, and 6 in Wellington.

The Union Colliery Company of B. C., Limited, has operated its No. 2 Union Colliery. and No. 4 slopes and No. 5 shaft, in the Comox District, in addition to sinking in shaft No. 6, and has also carried on its coke ovens and coal working plant at Union Bay. In the Douglas District, on the south foot-hills of Mt. Benson, this company has operated the Wellington Colliery known as the "Extension Mine," in which work has been carried on in the No. 2 slope and in a rock tunnel outlet, while in the Cranberry District it has operated the Alexandria Mine.

At Quatsino, on the North-West Coast of Vancouver Island, the West Quatsino Coal. Vancouver Island Commercial Company has opened up a number of coal seams, but has not, as yet, become a shipper.

The Crow's Nest Pass Coal Company, Limited, has opened up and Crow's Nest Pass Collieries. started to work several seams of fine bituminous coal on Coal Creek, a tributary of the Elk River in East Kootenay, at a point about 6 miles up from Fernie, and has, in addition, built and is now operating coke ovens at the latter point.

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**AGGREGATE SUMMARY OF RETURNS FOR THE YEAR 1898, FROM THE VANCOUVER  
ISLAND COLLIERIES.**

	Tons. (2,240 lbs.)	Cwt.	Tons. (2,240 lbs.)	Cwt.
Sold for consumption in Canada.....	365,506	11		
" export to other countries.....	752,826	—		
Total Sales.....			1,118,332	11
Stocks on hand first of year.....	30,230	11		
" last of year.....	38,429	10		
Difference added to stock during year...			8,198	19
Output of Collieries for year 1898 .....			1,126,531	10

**NUMBER OF MEN EMPLOYED.**

Character of Labour.	Number employed.		Total number employed.
	Underground.	Above ground.	
Whites—Miners.....	1,176	.....	1,176
Labourers.....	578	139	717
Mechanics.....	36	220	256
Boys.....	114	17	131
Japanese.....	125	37	162
Chinese.....	None (in Nov. & Dec.)	399	399
Indians.....	None.	None.	None.
Totals.....	2,029	812	2,841

In the above table, under the head of coal "sold for consumption in Canada," is included the coal used by the collieries themselves under boilers, etc., which, with the exception of that used by the locomotives or in sinking the shafts, consists mostly of dross or fine coal.

According to the Act (section 53), publication of the detailed returns of a colliery can only be made with the consent of the owners thereof, and as certain owners have refused such consent, I am unable to give a detailed account of the out-put, etc., of each mine from official returns as has been possible in previous years, but must confine myself to an aggregate summary as above.

I have, however, compiled the following tables from the monthly statements as published in the press, the resultant total differing somewhat, as will be seen, from that of the preceding official table.

## OUTPUT OF COAL, 1897 AND 1898.

	1897.	1898.
	Tons.	Tons.
New Vancouver Coal Mining & Land Co., Ltd .....	319,277	520,222
R. Dunsmuir & Sons.....	232,255	315,738
*Union Colliery Co. of B. C., Ltd. (Union Colliery) .....	246,926	236,395
" " (Alexandria Colliery) .....		45,560
Total Tons .....	798,458	1,117,915

\*Output of "Extension Mine" not given separately.

## FOREIGN SHIPMENTS OF COAL, 1898.

	New Vancouver Coal Mining & Land Co., Ltd.	R. Dunsmuir & Sons.	Union Colliery Co. of B. C. Ltd.
	Tons.	Tons.	Tons.
January .....	28,061	22,037	14,948
February .....	25,556	25,071	11,008
March .....	34,765	18,111	11,873
April .....	30,074	13,870	12,500
May .....	38,650	23,541	10,363
June .....	35,540	27,434	21,670
July .....	32,638	15,961	9,703
August .....	43,827	18,520	13,207
September .....	38,627	15,843	.....
October .....	36,689	15,399	4,522
November .....	27,907	16,026	2,882
December .....	31,201	20,829	17,008
Total Tons .....	403,535	232,642	129,684

## SUMMARY OF FOREIGN SHIPMENTS, 1897 AND 1898.

	1897.	1898.
	Tons.	Tons.
New Vancouver Coal Co .....	233,349	403,535
Wellington .....	188,139	232,642
Union .....	180,282	129,684
Total Tons .....	601,770	765,861

Of the above foreign shipments for 1898, 752,686 tons were, according to Customs returns, exported to ports of the United States.

San Francisco and the southern ports of California have been the chief markets for Vancouver Island coal, with Alaska, the Hawaiian Islands and steamships engaged in the China and Australian shipping trade, important and steadily increasing secondary consumers.

The following analysis of the source of the coal supply of California for 1898, is interesting as showing our relative importance in that market.



TABLE SHOWING SOURCE OF CALIFORNIA'S COAL SUPPLY FOR 1898.

British Columbia . . . . .	651,208 tons.
Australia . . . . .	201,931 "
England and Wales . . . . .	75,115 "
Scotland . . . . .	5,056 "
Eastern (Cumberland anthracite) . . . . .	37,560 "
Seattle (Franklin, Green River, etc.) . . . . .	283,963 "
Carbon Hill, South Prairie, etc. . . . .	348,474 "
Mount Diablo, Coos Bay and Coral Hollow . . . . .	172,506 "
Japan and Rocky Mountains (by rail) . . . . .	26,560 "
Total coal . . . . .	1,802,373 "

In the matter of coke imports California is credited with 41,630 tons for 1898, as against 30,320 tons in 1897, of which over one-half was derived from England and the remainder from British Columbia, Belgium and Australia.

The above considerations taken as a whole seem to indicate an abundant market for the yearly output of our mines, and the indications are that 1899 will not only prove a very prosperous year for the coal trade of the Pacific Coast, but that the collieries of the Province will be called upon to increase their present output.

## ANALYSES OF COAL.

From samples of coal delivered to me by the managers of the collieries named, analyses were made by the Provincial Assayer by "fast caking" process, with the following results:—

- |                                    |                                  |
|------------------------------------|----------------------------------|
| No. 1.—Lower seam, Union Mine.     | No. 4.—Alexandria Mine.          |
| No. 2.—Top seam, "                 | No. 5.—Wellington Coal.          |
| No. 3.—Lower seam, Extension Mine. | No. 6.—Top seam, Extension Mine. |
| No. 7.—Union coke.                 |                                  |

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.
Moisture . . . . .	1.43	.80	1.00	1.15	1.90	.75	.60
Volatile matter . . . . .	25.57	28.00	32.80	31.85	32.10	33.25	2.60
Fixed carbon . . . . .	65.00	57.60	60.80	58.70	56.40	58.04	80.00
Ash . . . . .	8.00	13.60	5.40	8.30	9.60	7.96	16.80
	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Caking quality . . . . .	Very fair.	Very fair.	Medium.	Medium.	Partial.	Partial.	.....

—o—

## NANAIMO COLLIERY.

This extensive colliery is the oldest of those now working in the Province. The original charter of the Old Vancouver Island Coal Company dates from 1862, when that company took over the coal mines at Nanaimo, then owned by the Hudson's Bay Company, and a large area of the surrounding coal lands.

These areas have since been added to, until now the New Vancouver Coal Mining and Land Co., Ltd., holds about 30,000 acres of coal lands.

The following are the Official Returns for the year from this colliery:—

## COAL MINES REGULATION ACT.

*Returns for the year ending December 31st, 1898, from Nanaimo Colliery,  
Nanaimo Town and District.*

Operated by New Vancouver Coal Mining and Land Company, Limited; head office at London, England.

## OFFICERS.

## ADDRESS.

J. Galsworthy, President or Chairman, 12, Old Jewry Chambers, Old Jewry, E.C., London.  
Joseph Ramsden, Secretary, 12, Old Jewry Chambers, Old Jewry, E.C., London.  
Samuel M. Robins, Superintendent, Esplanade, Nanaimo, B.C.

Share capital of Company, \$1,075,000. Debenture capital of company, \$250,000.

Value of Plant, \$350,000.

SALES AND OUTPUT FOR YEAR.  (Tons of 2,240 lbs.)	COAL.				COKE.			
	Tons	cwt.	Tons	cwt.	Tons	cwt.	Tons	cwt.
Sold for consumption in Canada .....	45,161	14						
" export to U. S. ....	372,164	—						
" " to other Countries .....	31,357	—						
Total Sales .....			448,682	14				
Used in making Coke .....								
" under Colliery Boilers, &c .....	69,481	17						
Total for Colliery Use .....			69,481	17				
Stocks on hand first of year .....	4,740	11						
" last of year .....	6,850	10						
Difference added to Stock during year .....			2,109	19				
Output of Colliery for year .....			520,274	10				

## NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &amp;c.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.
Supervision and Clerical Assistance .....	10		14			
Whites—Miners .....	449	\$3 to \$4.50				
Miners' Helpers .....						
Labourers (Pushers and Drivers) ..	382	\$2.50 to \$3	41	\$2.50		
Mechanics and Skilled Labour ...			97	\$3 to \$4		
Boys .....	28	\$1 to \$2	4	\$1 to \$1.50		
Japanese .....						
Chinese .....			161	\$1.12½ to \$1.25		
Indians .....						
Totals .....	869		317			

Name of Seams or Pits—Southfield No. 2, Southfield No. 5, No. 1 Esplanade Shaft, No. 1 Northfield Shaft, Protection Island Shaft.

Description of seams, tunnels, levels, shafts, &c., and number of same—Southfield No. 2, worked by slope, seam 6 to 10 feet; Southfield No. 5, worked by shaft, seam 5 to 10 feet; No. 1 Northfield Shaft, worked by shaft, seam 2 feet to 3 feet 6 inches; Protection Island Shaft, worked by shaft, lower seam 4 feet, upper seam 6 feet; No. 1 Esplanade Shaft, worked by shaft, seam 5 to 12 feet.

Description and length of tramway, plant, &c.—Railway to Southfield, 6 miles, with sidings; railway to No. 1 Shaft, 1 mile, with sidings; railway from Northfield Mine to wharf at Departure Bay,  $4\frac{1}{2}$  miles; rails are of steel, 56 lbs. per yard, of standard gauge, viz., 4 feet  $8\frac{1}{2}$  inches; 10 hauling and pumping engines, 19 steam pumps, 6 locomotives, 240 coal cars (6 tons), besides lumber and ballast cars; bunkers with capacity of 10,000 tons; fitting shops for machinery repairs, with turning lathes, boring, drilling, screw-cutting machines, hydraulic press, steam hammer, &c., &c.; diamond boring machinery for exploratory work (bores to 4,000 feet); 150 horse-power electric plant, engines, boilers, dynamos; 4 30 horse-power, 8-ton locomotives, and 1 15 horse-power locomotive; hauling and lighting equipment; wharves, 2,000 feet frontage, at which vessels of the largest tonnage can load at all stages of the tide.

SAMUEL M. ROBINS,  
*Superintendent.*

The Minister of Mines is hereby authorised to publish these Returns.

SAMUEL M. ROBINS.  
*Superintendent.*

#### NO. 1 SHAFT, ESPLANADE.

Joseph Randall, Overman.

At a point on the Esplanade to the east and to the dip of the site of the old Douglas Pit, still to be seen between Nicol Street and Victoria Road, Nanaimo, a bore hole was put down in 1881, by the New Vancouver Coal Mining and Land Company. At a depth of 650 feet coal was reached and a seam 8 feet 6 inches thick was bored through.

Upon this showing, together with other data obtained by diamond drilling, the Company, on the advice of an eminent engineer, put down two circular shafts, respectively 18 and 16 feet in diameter, installed powerful hoisting and ventilating plants and commenced shipments on a large scale. These shipments have since been continuous, and the annexed returns show what has been done during the past year. The proximity of the shaft to the shipping docks has been of great advantage in facilitating the loading of vessels whether by night or day.

The main slope runs east from the bottom of No. 2 shaft—the 16-foot upcast shaft—for some 2,200 yards, from which levels Nos. 1, 2, and 3, north, have been run. The present workings are off the Nos. 2 and 3 levels, north, and off inclines driven westerly for from 1,000 to 1,400 yards from points on No. 1 level, north, distant some 2 or 3 miles from the shaft.

Haulage. Hauling is done in two parts, along No. 1 level for  $2\frac{1}{2}$  miles, and down in No. 3 level for about  $1\frac{1}{2}$  miles. The motive power employed is provided by electric motors, which haul as many as 96 loaded mine cars at a trip, each car having a capacity of 15 tons of coal. Tracks and rolling stock are kept in good order and the system is operated with the greatest care, as shown by the very few accidents which have occurred notwithstanding the high speed of travel maintained. From points farther in

than is reached by the electric haulage system mules are used, 15 to each shift in the upper levels and inclines, and 9 in the workings off No. 3 level. The coal from No. 3 level is hauled up the main slope to the shaft, a distance of 600 yards, by a 16 x 36 inch steam winding engine placed at the head of the slope.

**System of Working.** Mining is carried on by the "pillar and stall panel system." Pillars are being taken out from No. 2 and No. 3 levels and also from the panels of the inclines running from No. 1 level.

The seam is from 3 to 8 feet thick and is well bedded with good roof and floor. Little trouble has been caused by water. Dust is not met with in any quantity in the working parts of the mine, and any accumulations are removed or dampened to avert any danger from this source.

The mine workings are in charge of an overseer, and there are six firemen or mine examiners, two on each of the three shifts, every precaution being taken to ensure the safety of the miners. The "shot-lighters" and timbermen are experienced miners and can be relied upon in any emergency.

**Ventilation.** Air-ways and levels are well constructed, of sufficient sectional area for ample ventilation, and are kept in first-rate repair. Connection has been made by way of the No. 1 and No. 3 north levels, with the Protection Island shaft, which is used as an air "intake" for the ventilation of the workings on these levels, No. 2 shaft, Esplanade (16 feet diameter), being the "upcast." No. 1 shaft (18 feet diameter) is the hoisting shaft and serves also as the air "intake" for the ventilation of that portion of the mine in its vicinity, as well as for the mule stables, etc.

Ventilation is effected through No. 2 shaft by a 36-foot by 12-foot Guibal fan, built by Black, Hawthorne & Co, of Gateshead-on-Tyne, England, to which is directly connected a suitable engine, making from 40 to 46 revolutions per minute. The fan is assisted by the exhaust of the steam hoisting engine, which is at the head of the main slope.

The volume of air drawn by these agencies through and around the faces and workings amounts to from 150,000 to 165,000 cubic feet per minute and is in my opinion ample for all requirements.

I measured the air derived from Protection Island shaft for the ventilation of the workings from No. 1 level, and found it amounted to some 44,800 cubic feet per minute. Of this amount some 18,500 cubic feet went up No. 1 incline, supplying 50 men and 9 mules; 9,600 cubic feet went up No. 2 incline, supplying 51 men and 9 mules; while a leakage of some 16,700 cubic feet kept the level and the old workings clear.

For the ventilation of No. 2 and No. 3 levels and the main slope, some 16,600 cubic feet of air was in circulation, taken from the same source, and supplying 62 men and boys and 9 mules.

About 50,100 cubic feet of air per minute is taken down the No. 1 or hoisting shaft, supplying some 50 men employed around the bottom of the shaft and about the machinery, afterwards ventilating the stables in which some 50 mules are kept.

No. 2 shaft, as before stated, is the "upcast" not only for this mine but also for the Protection Island workings, from which some 52,500 cubic feet of air per minute are drawn, making a total volume of air of 164,000 cubic feet going up the "upcast" at the time I tested it.

**Drainage.** Such water as is found to the dip, is pumped by small pumps driven by compressed air, up to the sump at the bottom of No. 1 shaft, from which it is lifted to the surface by means of a force pump.

The No. 2 or upcast shaft, which had in 1884 been sunk to the Douglas Underlying Seam, a depth of 650 feet, was in 1887 deepened by about 71 feet, and at which additional depth it cut another and lower seam of coal some 6 feet in thickness.

On this lower seam, drifts were run from the shaft for short distances north and south, "on the strike of the metals," but exploratory work was not further prosecuted here.

A number of bore holes have been put down by hand-power diamond drills, from various points on the Douglas seam, till they cut the lower seam. In most places these bore holes found workable coal, not of great thickness but of first-class quality. The thickness of the measures between these two seams was found, over the area tested, to vary only slightly, being between 60 and 70 feet.

While the upper seam is under full operation, it would scarcely be prudent to work the lower seam, but when the Douglas seam is exhausted the lower one will undoubtedly be worked by the company.

The pit head is built of 16 x 16-inch timbers, the platform being 25 feet above the surface, while the shaft-head frame and gear rises 50 feet higher. The arrangement of the bank-head is good, and provides for weighing the mine cars, dumping on to the screens for railway shipment, or into the chute for town trade, proper facilities being provided for the disposal of any and all refuse matter sent up from below.

As a matter of fact, the arrangements have to be good and well worked, for when a motor with a train of 90 cars arrives at the pit bottom, it has to be attended to promptly and not delayed, as it has to return with its empties and pass the next loaded train at the regular siding.

There is always an ample supply of timber for props and lagging—for the use of the miners—kept alongside of the track leading to the Landing of the shaft, on the ground level, from which point both timber and other mine supplies are sent down below.

A large percentage of the screenings from the coal are passed through a coal-washing plant, and a cheaper grade of clean, small coal produced. This plant consists of two jigs, with fixed screens, the plungers being operated by eccentrics, and is said to have a capacity of 10 tons per hour.

A short distance from the shaft, and covered by a good engine-house, is the hoisting plant, consisting of a pair of 30 x 60-inch, Cornish valve, direct acting, high pressure engines, operating a 15-foot drum, provided with a 10-inch cylinder steam brake, etc., and capable of hoisting 6 tons 30 feet per second on a steam pressure of 50 lbs.

The steam for the hoisting engines is generated by a rather old plant, consisting of four 2-flue Lancashire boilers and four "egg-ended" boilers, which give an ample supply under a pressure of 60 lbs., using as fuel only slack or waste coal.

In the ante-room off the engine room are kept a barometer and the record books, for the use of the mine examiners.

No. 1 Shaft and the engine houses above and below ground are lighted by incandescent electric lights, while an additional gas service is provided at the surface.

The electric power house is situated across the road from the pit head. The plant consists of two 2-flue boilers, two 150 h.p. Ball engines (Erie, Pa.) each running a separate dynamo, generating a current of 275 volts.

There are suitable switchboards and such instruments as are needed to regulate and control the current.

The plant supplies power for three electric motors and an electric winch underground, and provides all the electric lighting that is required.

The various parts of the works are in communication, and are connected  
**Telephones.** with the Superintendent's office by telephone, while a wire goes down No. 1 Shaft, along No. 1 Level, and up Protection Island Shaft to a telephone in the engine room there, thus making a submarine telephone connection.

The coal from the screens goes into cars of the hopper type, carrying  
**Railway.** about 5 tons each, which are pulled by 40-ton locomotives over a standard gauge railway to the Nanaimo wharves—belonging to the company—a short distance away, where the coal is loaded into vessels.

#### PROTECTION ISLAND SHAFT.

Thomas Mills, Overman.

This shaft was sunk by the Company in 1891, at Execution Point, on Protection Island, across the Harbour from the Nanaimo wharves.

The coal was reached at 670 feet down and a hoisting plant was at once erected, consisting of a lofty shaft-head, hoisting engine, 21 x 42 inches, with boilers, boiler house, coal bunkers, coal washers, and a fine wharf running out to deep water and not over 400 feet from the shaft.

From the bottom of the shaft two slopes were driven, east and north-east, each in nearly a mile, but little further work has been done on them since. A diagonal slope was driven about 1,400 yards, and from a point about 600 feet down this slope a slant was driven S. 81° E. for some 780 yards, for the purpose of taking out the area of coal lying between the main (east) slope and the diagonal slope just mentioned. From this area the greater part of the present output is being taken.

The coal was worked by the "pillar and stall" system; and the Company is now drawing the pillars. The coal is easily worked and is from 3 to 8 feet thick.

The hauling on the slopes is accomplished by endless wire ropes connected with 5-foot drums below, which are in turn operated by an engine at the surface. The system works well and fulfils all the requirements, but the friction and consequent wear and tear are very considerable.

This shaft was shut down for some time and only started up again in February, 1898; since then it has been a steady and large producer.

In 1892 the shaft was sunk an additional 62 feet cutting the lower  
**Underlying Seam.** seam, already mentioned as underlying in the No. 1 shaft workings. On this lower seam a slope was put away and run for 350 yards, from which slope levels were started, simply to prove the seam, which is held in reserve for future working. The thickness of the seam at the face of the slope was found to be about 4 feet.

The Protection Island shaft, 18 x 12 feet, serves as the air "intake," not  
**Ventilation.** only for the ventilation of its own workings but also for the greater part of the workings from No. 1 shaft, as has already been described. For the ventilation of the workings at present under consideration, some 52,500 cubic feet of air per minute is being utilized, of which 36,000 cubic feet goes to the diagonal slope, supplying 50

men and 1 mule, while 16,500 cubic feet goes to the main slope, supplying 49 men and 2 mules. The return air is drawn over to and up the No. 2 Nanaimo shaft. A common downtake and upcast is thus used by these two mines.

The workmen employed here live in Nanaimo and are conveyed to and from their work by the Company's steamer "Mermaid."

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#### NO. 5 SHAFT, SOUTHFIELD.

Richard Gibson, Overman.

This mine is in the south coal field, a portion of the Company's estate, which was worked a few years ago under the name of the "Southfield Mines." The property is connected by the Company's railway with their No. 1 shaft and the docks, a distance of four miles.

The shaft is down some 508 feet to the coal, which varies in thickness from 5 to 22 feet, having distinctive characteristics, and is known locally as "Southfield coal." It is a good steam coal, low in ash and makes good coke.

From the bottom of the shaft a slope has been driven from which have  
**Workings.** been set off to the east a level and an incline. The "pillar and" stall system is employed in working, but the principal extraction at present is from robbing the pillars.

No. 5 shaft is divided in two by a partition, one part serving as an  
**Ventilation.** "upcast," while the other, in conjunction with the old No. 4 shaft, serves as an "intake." A Murphy fan serves as a ventilator and caused a circulation of 62,400 cubic feet of air per minute, which amply serves for the 80 men and 10 mules employed. This current is split into two about equal parts, which go respectively to the workings in the levels and off the incline.

The pit head is substantial, well arranged, and capable of handling a  
**Hoisting Plant.** large output. The hoisting engine is 16 x 36 inches, with a full complement of boilers of the Lancashire type.

The workmen live in Nanaimo, and are conveyed to and from work by the railway.

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#### NORTHFIELD MINE.

This mine is not at present being worked, although the mine plant, railway, and wharves are maintained in good condition, and work could be started at very short notice.

No. 1 Shaft is used as the downtake, and the No. 2 as the uptake.

Within this last year, some pumping was done and an examination made of the workings within 150 yards of the shaft.

The boundaries of this mine and of the adjoining Wellington Mine are co-terminous for about a mile and a half, so the greatest care will have to be exercised in approaching the boundary to see that the surveys are correct, as any "overlapping" might cause a frightful accident.

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### SHIPPING FACILITIES.

The shipping facilities of this company are excellent. The depth of water at the docks is such that any vessel can lay alongside safely, while the harbour is sheltered and well protected.

At Protection Island, the pit head and the bunkers on the wharf are so close together as to need no railway, while the coal runs from the bunkers directly into the vessels by gravity.

The coal from the other pits is brought by the company's railway a very short distance to the Nanaimo wharves, which have this year been thoroughly overhauled and improved.

The bunker capacity on and near the docks has been greatly increased, and is capable of holding a very large reserve stock.

On these docks, the company's engineer, W. H. Wall, has erected a very ingenious and novel loading platform of his own design, which is worked by steam power, and has greatly facilitated rapid loading and reduced the labour expense. The speed with which a vessel may be loaded is now limited only by the time required for trimming the cargo in the hold of the vessel. One of the company's steamers, the "Titania," plying between Nanaimo and San Francisco, having suitable hatches, takes on her full cargo and bunker coal, amounting to 6,000 tons, in 12 hours.

### MACHINE AND WORKSHOPS.

The shops are thoroughly equipped with modern appliances and tools, and consist of machine and fitting shops for repairing engines, locomotives, and rolling stock; also blacksmith shops, carpenter and car shops, where the colliery waggons are made and repaired.

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### WELLINGTON COLLIERY.

Operated by R. Dunsmuir & Sons; Andrew Bryden, Manager. Head Office, Victoria, B. C.

The detailed Returns from this colliery have had to be omitted, in accordance with section 53 of the "Coal Mines Regulation Act," as the owners have refused permission to publish same.

The principal mines of this old established colliery are situated about 6 miles to the north-west of Nanaimo, and 3 miles from Departure Bay, which Bay is connected with Nanaimo Harbour by Exit Passage, both being under the same Customs and Harbour authorities.

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### No. 1 SHAFT.

William Bailey, Overman.

This pit, distant about a mile from the Bay, was first sunk, in a small way, about 25 years ago, by the late Hon. Robt. Dunsmuir. After reaching the coal, no further work was done until 1891, when it was again started, the shaft being enlarged to 8 x 18 feet and substantially timbered.

The coal was found at a depth of 300 feet from the surface, the seam being about 3 feet thick.



The mine is worked by a slope from the bottom of the shaft, with levels therefrom to the westward. The roof of the seam is tender. The ventilation is good, there being 8,000 cubic feet of air per minute for 30 men and 2 mules. The shaft is the "intake," the "return" being the fan shaft at No. 5 Shaft.

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#### No. 3 SHAFT.

James Sharp, Overman.

This shaft reached the coal at a depth of 210 feet, at which point a slope was driven, from which levels were run off. At the present time, only pillars are being worked, and these are nearly finished.

The main shaft is divided by a partition, one compartment serving as  
Ventilation. an "intake," and the other as an "upcast." A home-made Guibal fan, 39 x 10 feet, is used, driven by a 14 x 60-inch engine. The total volume of air in circulation is 33,000 cubic feet, distributed as follows: To No. 2 Level, 6,050 cubic feet, supplying 19 men and 2 mules; to No. 3 Level, 9,720 cubic feet, supplying 20 men and 3 mules, leaving 17,230 cubic feet to be accounted for by leakage, which passes by doors and curtains through the old workings.

Upon application being made to me for permission to increase the working force to 60 men—as the connection with No. 4 Shaft, now shut up, was no longer available—I had no hesitation in recommending it, being so well satisfied with the way in which the mine was being worked, and feeling it was perfectly safe to do so.

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#### No. 5 SHAFT.

David Wilson, Overman.

This is an important mine, well laid out and kept in good order, and is under excellent management. The shaft is 265 feet deep, from the bottom of which is a slope, with levels and inclines. The seam is from 5 to 10 feet thick, and its mode of occurrence is such that a very large percentage of the coal left in the pillars and as roof in the stalls can eventually be recovered. Considerable of the mining here has been "long wall" work, which has been done in a creditable and miner-like manner.

Ventilation is effected by means of a 14 x 5 Guibal fan, drawing up  
Ventilation. through the No. 5 fan shaft, which serves as an "upcast," not only for these workings but also for No. 1 Shaft workings, as already described. The total volume of air travelling in the fan shaft is 124,000 cubic feet per minute, which includes 8,000 cubic feet taken from No. 1 Shaft workings, leaving 116,000 cubic feet of air for these workings, which is split up as follows:—North-west level, 47,500 cubic feet for 75 men and 12 mules; east side, 18,000 cubic feet for 14 men and 1 mule; west side, 19,500 cubic feet for 20 men and 2 mules; side slope, 30,000 cubic feet for 30 men and 2 mules; leakage, 1,000 cubic feet.

The shaft head arrangements, hoisting engine, boilers, air compressor, and fan are good, and are kept in excellent order. There being a siding from the E. & N. Ry. right up to the bunkers, coal can be loaded directly into the railway cars.

Just before my appointment as Inspector, a cave from the surface occurred in this mine, caused by driving into the gravel beyond the rock caves, north-westerly. By coming back about 50 yards under good roof-caves, and cogging up the way by which the gravel and water entered the workings, the mine was secured to my satisfaction.

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#### No. 6 SHAFT.

This mine is about a mile to the south of No. 5 Shaft. The pillars near the shaft bottom were being taken out, and only about a month's work remained to finish.

About 20 men were at work, the supply of air being about 45,000 cubic feet per minute.

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#### MACHINE SHOPS, &c.

The machine and general workshops are well fitted up with first-class lathes and modern mechanical appliances, and are equal to all demands of an extensive colliery.

#### SHIPPING FACILITIES.

From the north shore of Departure Bay, three shipping wharves with T heads project into deep water, over 27 feet at lowest tide, and from these wharves the Wellington coal has been shipped for many years.

The main wharf is equipped with a "Link Belt Conveyor," about 3 feet wide, which receives the coal from a hopper into which the cars are dumped, and conveys it on an incline to a chute, down which it slides into the hold of the vessel. The lower end of the conveyor and chute can be adjusted by blocks and falls to suit the state of the tide and height of the vessel's deck. The usual rate of loading is about 150 tons per hour, but it can be worked up to 200 tons.

Vessels waiting find a well-sheltered anchorage in the lee of Newcastle Island, and can discharge their ballast into deep water.

The colliery railway is 36 inches gauge. The cars, having a capacity of about  $3\frac{1}{4}$  tons, are brought from the mine down a steep grade by suitable locomotives. Bunkers are provided at the rear of the wharf for storage. There is also a coal washer, well supplied with fresh water.

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#### UNION COLLIERY.

Operated by the Union Colliery Company, head office Victoria, B. C. Jas. Dunsmuir, President; Jno. Bryden, Vice-President; C. E. Pooley, Secretary, all of Victoria; Alex. Dunsmuir, Treasurer, San Francisco; and John Matthews, Manager, Union.

The detailed Returns from this colliery have had to be omitted, in accordance with section 53 of the "Coal Mines Regulation Act," as the owners have refused permission to publish same.

The shipping wharves of this colliery are located at Union Bay, Baynes Sound, on the East Coast of Vancouver Island, where are also situated a well equipped Luhrig coal washer, a coking plant consisting of two batteries, each of 100 bee-hive ovens, and large and suitable coal bunkers. The mines being operated are situated at the town of Union, about eleven miles

north-west of Union Bay, connection between the two points being maintained by means of the standard gauge railway, built, owned and operated by the Company.

In addition to the collieries and works at Union, this Company is also operating the Alexandria Mine, in the Cranberry District, and the "Extension Mine," in the Douglas District.

#### No. 2 SLOPE.

This slope is down some 700 yards and was worked during the first six months of the year, but has since been shut down.

#### No. 4 SLOPE.

Richard Short, Overman.

This is an important and valuable mine producing a superior quality of coal.

The main slope is down some 6,600 feet (N. 25° W.), and from it, at a point about 300 feet from the surface, the No. 2 or diagonal slope branches off to the east at an angle of 45° (N. 20° E.). This diagonal slope has been run for 4,000 feet, nearly to the true dip of the coal, and although not as long as the main slope, the vertical depth attained therein is greater than in the latter, which runs across the dip.

At a point some 5,280 feet down the main slope a second diagonal slope has been run, parallel to the one already mentioned (N. 20° E.), and is now down 1,150 feet.

Off the No. 2 or diagonal slope, levels Nos. 10, 11, 12, and 13 are being worked to the east and west, while connection with the main slope is made through No. 11 level. From the old main slope levels Nos. 11, 12, and 13 are now being worked on either side.

The diagonal from this slope cuts through levels 12 and 13 to the east of the slope, and from this diagonal No. 14 level has recently been run 175 yards westerly, towards the main slope, and 200 yards easterly.

The hoisting plant consisting of a large double-cylinder engine geared to double loose drums, boilers, etc., is situated 700 feet from the mouth of the slope, from which point the engineer hoists and dumps the mine cars. The slope head arrangements are such that these cars go to the tippler and return automatically. About 12 cars, each holding one ton, are brought up in one trip. Hoisting is through the main and No. 2 or diagonal slopes. In the new diagonal slope the coal is hoisted by an electric winch up to the old slope.

In lowering a run of empties there are difficulties met with in that certain flat places occur in the slope, where the grade is not sufficient to carry the rope. This is overcome by the use of a tail rope.

Ventilation. Ventilation is effected by a 14 x 5 feet Guibal fan, now causing a circulation of 65,000 cubic feet of air per minute, but if the fan was run up to its capacity of 95 revolutions it would move 85,000 cubic feet of air.

The air enters by the haulage slopes and is divided into separate splits, the main split being at the point where No. 2 branches off the main slope, part of the air going down each slope. Further down each of these slopes the air is again split and sent to the workings to the east and west of the respective slopes.

I found the air circulating as follows:—Diagonal slope, east workings, 9,400 cubic feet per minute, for 34 men and 3 mules; west workings, 12,200 cubic feet, for 58 men and 6 mules; old or main slope, east workings, 9,800 cubic feet, for 54 men and 5 mules; west workings, 15,400 cubic feet, for 60 men and 6 mules.

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The ventilation is good and sufficient for all requirements. The mine is free from dust, under good supervision, and the safety of the miners is properly guarded.

The coal will average about 4 feet in thickness, and is being worked by the "pillar and stall" system.

There are two steam and eight triple electric pumps in the mine, the power for the latter being generated by two dynamos on the surface.

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#### NO. 5 SHAFT.

This shaft is sunk vertically, and cuts through two seams of coal, the upper seam at 275 feet and the lower seam at a depth of 590 feet from the surface. The shaft is 23 x 8 feet inside, very substantially constructed of heavy timbers and well lined. A partition of 3 x 12-inch planking, lined with tar-paper, divides the shaft into two compartments, one used as the air "downtake" and the other as the "upcast."

*Upper Seam*—A heading has been started in this seam, and is now in 200 feet. Some 9 men were at work on each of two shifts, and were well supplied with air, some 8,000 cubic feet per minute being in circulation.

*Lower Seam*—From the bottom of the shaft, an incline has been driven off to the south and headings off to the east and west. The heading to the east is now in 2,200 feet, while the incline is run about the same distance, and is being pushed forward to connect with No. 6 Shaft, now being sunk, which will then be used as the "upcast."

As already stated, the shaft is at present used as both a downtake and  
**Ventilation.** upcast. The ventilation is good and all-sufficient, a 14 x 5-foot Guibal fan being in use. The volume of air in circulation on the east side is 21,400 cubic feet per minute, supplying 35 men and 4 mules. The volume of air in circulation on the west side is 14,000 cubic feet for 6 men and boys.

The pit-head works are good. The hoisting plant consists of a double-  
**Hoisting Plant.** cylinder, 30 x 60-inch engine, connected with a 14-foot winding drum fitted with steam brakes, and has ample boiler service.

The shaft is connected by railway with the wharves, and all is in readiness for extensive working as soon as the connection for air is made with the No. 6 Shaft, which should be finished in 1899.

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#### NO. 6 SHAFT.

This shaft, which has already been referred to, is being energetically sunk by the company at a point distant some 4,300 feet to the south from No. 5 Shaft. The shaft is now down 215 feet, and at the rate of progress now being made should be down to the coal some time in July. The work is being done in a workman-like manner, and every precaution is taken to ensure the safety of the miners.

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#### MACHINE SHOPS.

The company is well provided with machine and repair shops, which are well equipped and equal to the demands of a large and important colliery.

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#### COAL WASHER.

At Union Bay, the company has built and is operating a large and very complete coal-washing plant of the "Luhrig" pattern, producing from the screenings of the mines a washed product of various sizes, a part of which is sold, and the remainder goes to the coke ovens. The machinery is operated by steam generated by boilers heated by the waste gases from the coke ovens.

#### COKE OVENS.

Near the coal washer, two batteries, each of 100 bee-hive coke ovens, have been erected, the second battery having only just been completed. The fine, washed coal is elevated at the washer into elevated bins, from which it drops into cars, which are hauled by an endless rope over the tops of the ovens, to be dropped where required.

The coke is pulled out of the ovens by hand on to a cooling floor, which is covered by a shed. From this shed the coke is loaded directly on to railway cars, and that portion of it going inland over the C. P. Ry. is taken over to Vancouver in the same cars on a transfer float.

The coke produced is good, bright, and firm, and well coked, although the ash contained is rather high, as shown by analysis already given.

Fire-brick are being made by the company from clay found associated with the coal, and some of the brick have been used in the new coke ovens, but this industry is, as yet, in the experimental stage.

#### RAILWAY AND SHIPPING FACILITIES.

The coal from the collieries at Union is brought down to the Bay, a distance of 11 miles, by a standard-gauge railway operated by the company, the large, 25-ton, gondola cars being used.

The road is down grade from the mine, and is in fair repair, although important improvements have been instituted since the sad accident of August 17th last, when a passenger train broke through the high bridge over the Trent River, causing the loss of many lives.

The old bridge has been repaired and is still in use, but it is to be hoped the new bridge now in course of construction will soon be finished.

On the line of the railway, and near the Bay, the Company has erected large coal bunkers capable of holding 4,000 tons, used as a reserve for shipments.

A well appointed wharf projects out into deep water, with berths on either side at which the largest vessels can lie in safety. Chutes are arranged for loading vessels from the cars with all possible dispatch.

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#### ALEXANDRIA COLLIERY.

##### JOHN DICK, MANAGER.

This mine is situated in the Cranberry District, about 5 miles south of Nanaimo, and is operated by the Union Colliery Company.

At a point just to the west of the tracks of the E. and N. Railway, a slope was started several years ago and was continued down some 700 yards, with an easterly course, when operations were suspended, nothing further being done until 1896, when work was resumed.

Levels were then started off to the north and south from a point 650 yards down the slope, the former of which is now in 900 yards and the latter about 50 yards. All the workings are off the north level, to both the dip and rise, the coal being worked by the "pillar and stall" system.

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The seam is irregular in thickness, varying from 3 to 18 feet, the coal having the same characteristics as that in the Southfield seam.

A 14 x 5 foot Guibal fan is in use and causes a circulation of 39,300 cubic feet of air per minute for the use of 73 men and 4 mules.

A small pump relieves the mine of the water made.

A good hoisting engine and substantial slope-head works have been erected, the latter connected by sidings with the E. and N. Railway, by which the coal is shipped to Victoria and Wellington.

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### EXTENSION MINE.

JAMES HAGGART, OVERMAN.

This mine is situated in the Douglas District, on the south slope of Mount Benson and is operated by the Union Colliery Company.

#### No. 2 SLOPE.

No. 2 slope is being worked and is now down 1,600 feet. From a point 1,400 feet down, levels and counter levels have been driven east and west, the former now being in 1,040 feet, and the latter 940 feet. No stalls have as yet been broken off these levels.

Ventilation is effected by means of a furnace and steam jet, supplying 15,000 cubic feet of air per minute for the use of the 16 men here employed.

About 100 feet vertically below the mouth of the slope, a 6 x 9 tunnel  
Rock Tunnels. is being driven from the surface in line with the slope, and is calculated to strike it at 133 yards down. Just above Overton's Lake an 8 x 14 foot main tunnel is being driven to strike the east level, and is now in 2,624 feet, with about the same distance yet to go.

The ventilation of the tunnel is effected by means of a furnace, the air being conducted to the face in 3 x 2½ ft. wooden boxes. I found 4,812 cubic feet of air per minute in circulation, supplying the 9 men and 1 mule working.

#### RAILWAY AND SHIPPING FACILITIES.

A branch railway is being constructed to connect the main tunnel outlet with the E. and N. Railway at a point a little above the bridge over the Nanaimo River.

At Oyster Harbour, on a branch line from the E. and N. Railway, large coal bunkers were in course of construction. These are to be 400 feet long, 38 feet wide, and of an average depth of 25 feet, capable of holding 8,000 tons of coal. From chutes on either side coal can be loaded into cars underneath on tracks leading to the shipping wharves now being constructed, and at which the largest vessels can lie in safety, there being 30 feet of water at low tide.

—o—

### CROW'S NEST PASS COLLIERY.

The coal field in which this colliery is situated has only become available since the completion of the Crow's Nest Pass branch of the Canadian Pacific Railway, and has been in operation for but a short time. I have not been able, as yet, to inspect this colliery.

## COAL MINES REGULATION ACT.

*Returns for year ending December 31st, 1898, from Coal Creek Colliery, Fernie Town,  
South-East Kootenay District.*

Operated by The Crow's Nest Pass Coal Company ; head office at ———

## OFFICERS.

Hon. Col. Jas. Baker, President, Victoria.

Wm. Hanson, Man. Director, Montreal.

Senator Cox, Vice-President, Toronto.

E. Hanson, Treasurer, Montreal.

J. A. Gemmill, Secretary, Ottawa.

Wm. Blakemore, Gen'l Manager, Fernie.

Frank Smith, Mine Manager, Fernie.

Capital of Company, \$1,500,000    Value of Plant, \$50,000.

SALES AND OUTPUT FOR YEAR.  (Tons of 2,240 lbs.)	COAL.				COKE.			
	Tons	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada .....	9,297	....			322	9		
"    export to U. S. ....	37	....			38	11		
"    "    to other Countries .....								
Total Sales .....			9,334				361	
Used in making Coke .....	470	....						
"    under Colliery Boilers, &c .....	150	....						
Total for Colliery Use .....			620					
Stocks on hand first of year. ....								
"    last of year .....								
Difference added to Stock during year .....								
Output of Colliery for year .....			9,954				361	

## NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &amp;c.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.	No. Em- ployed.	Average Daily Wage.
Supervision and Clerical Assistance .....	2	\$3	4	\$3	6	\$3
Whites—Miners .....	60	\$2.50			60	\$2.50 to \$3
Miners' Helpers .....						
Labourers .....	10	\$2	25	\$1.75	35	\$1.75 to \$2
Mechanics and Skilled Labour .....			20	\$2 to \$3	20	\$2 to \$3
Boys .....	2	\$1			2	\$1
Japanese .....						
Chinese .....						
Indians .....						
Totals .....	74		49		123	

Name of Seams or Pits—No. 1 seam, No. 2 seam.

Description of seams, tunnels, levels, shafts, &c., and number of same—No. 1 seam, 5 feet 6 inches clean coal; two tunnels driven through 150 feet of gravel to coal, and driven in the coal 600 feet, with cross-cuts every 100 feet; five rooms; system of working, pillar and stall, 30 feet and 18 feet respectively. No. 2 seam, 6 feet clean coal; two level tunnels, lower started on outcrop of coal, upper through 300 feet of gravel; levels 1,500 feet in coal; eight rooms; system of working, pillar and stall, 30 feet and 18 feet; pitch of seam 10° to 14°. No. 1, furnace ventilation; No. 2, Murphy fan.

Description and length of tramway, plant, &c.—Trestle connecting Nos. 1 and 2 mines, 1,000 feet apart; railway five miles long from town of Fernie to mines. Fernie is situated on the main line of the Crow's Nest Pass Railroad.

THE CROW'S NEST PASS COAL CO'Y, LTD.

W. BLAKEMORE, *General Manager.*

The Minister of Mines is hereby authorised to publish these Returns.

THE CROW'S NEST PASS COAL CO'Y, LTD.

W. BLAKEMORE, *General Manager.*

#### ACCIDENTS OCCURRING IN VANCOUVER ISLAND COLLIERIES DURING 1898.

CAUSE OF ACCIDENT AND NATURE OF INJURY.	COLLIERY AT WHICH ACCIDENT OCCURRED.															TOTALS FOR YEAR IN ALL VAN- COUVER ISLAND COLLIERIES.			
	Nanaimo.			Welling- ton.			Union.			Extension.			Alexandria.			Total.	Fatal.	Serious.	Slight.
	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.				
Explosion of Gas .....																19			
Fatal .....	2																2		
Serious .....		7			1			3			3							14	
Slight .....						1			2										3
Fall of Coal .....																7			
Fatal .....	1							2									3		
Serious .....		1			2									1				4	
Slight .....																			0
Fall of Rock .....																9			
Fatal .....						1											1		
Serious .....		3			1			1										5	
Slight .....									1			2							3
From Mine Cars .....																13			
Fatal .....						1											1		
Serious .....		3			6													9	
Slight .....						2			1										3
From Mine Mules .....																2			
Fatal .....																	0		
Serious .....					1			1										2	
Slight .....																			0
Powder in Mine .....																4			
Fatal .....																	0		
Serious .....					3													3	
Slight .....									1										1
Timber—at Pit-head .....																2			
Fatal .....																	0		
Serious .....		1			1													2	
Slight .....																			0
	3	15	...	...	15	3	4	5	5	...	3	2	...	1	...	56	7	39	10



## STATEMENT IN DETAIL OF SUCH ACCIDENTS.

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
1898.					
1	Union .....	Jan. 12th.	Okading (Jap.).	Labourer .....	Fatally injured by loaded mine cars while crossing No. 4 Slope.
2	" .....	" 14th.	D. Walker ....	Overman. ....	Slightly injured by a small charge of giant powder going off unexpectedly in No. 4 Slope.
3	Wellington ....	" 15th.	John J. Thomas	Fireman .....	Slightly burned by explosion of gas in No. 5 Shaft.
4	Union .....	" 17th.	Angelo Lorenzo	Miner .....	Slightly burned by explosion of gas in their stalls in No. 4 Slope.
5	" .....	" 17th.	Son of "	" .....	
6	" .....	" 17th.	Chun Ah Moy.	Miner's Helper	Fatally injured by fall of top coal while working in stall in No. 4 Slope.
7	Extension Mine	" 26th.	A Chinaman ..	.....	Entered the working place immediately after a shot had been fired and was burned by explosion of gas that had accumulated there.
8	Alexandria ....	" 31st.	J. W. Dykes..	Miner .....	Leg broken by fall of coal in stall.
9	Wellington ....	Feb. 2nd.	James Kerr ...	Runner .....	Slightly injured by a mine car in No. 4 Shaft.
10	" .....	" 9th.	Joseph Radalet	Mule Driver...	Foot slightly injured while working in No. 5 Shaft, by a box.
11	Extension Mine	Mch. 9th.	A Chinaman ..	Labourer .....	Slightly injured by a piece of rock at face of rock tunnel driving into mine.
12	Wellington ....	" 10th.	Wm. Morgan ..	Mule Driver...	Leg broken by car in No. 1 Shaft.
13	" .....	" 26th.	Jas. Johnston .	" .....	Leg broken by car in No. 5 Shaft.
14	Extension Mine	" 31st.	Robert Ross...	Miner .....	Burned by explosion of gas in No. 2 Slope.
15	" .....	" 31st.	A Chinaman ..	Helper .....	Burned by same explosion.
16	Wellington ....	April 7th.	John Sedlock..	Mule Driver...	Two ribs broken while at work in No. 4 Shaft (no cause assigned in colliery report).
17	Nanaimo .....	" 7th.	John Bradshaw	Miner .....	Leg broken by fall of rock from roof of stall in No. 1 Shaft.
18	" .....	" 22nd.	Ah Moon .....	Outsider .....	Hurt by fall of timber at pit head, Protection Island Shaft.
19	Union .....	" 30th.	Joseph Livesly.	Miner .....	Arm broken by fall of rock while putting up a prop in No. 5 Shaft.
20	" .....	" 30th.	Ah Wong .....	Runner .....	Knee sprained while in the act of pushing an empty car up to a stall when a full car was coming down, in No. 5 Shaft.
21	Nanaimo .....	May 13th.	J. Westfeldt ..	" .....	Arm dislocated at shoulder by fall of rock while at work in No. 1 Shaft.
22	Union .....	" 25th.	Solar .....	Miner .....	Burned by explosion of gas. The colliery report states that "he crossed a fence which had a notice posted upon it, stating that gas was there," in No. 4 Slope.
23	" .....	" 25th.	Sing .....	Helper .....	
24	Extension Mine	" 26th.	Wm. Cosier ...	Miner .....	Slightly hurt by shale falling on his back while taking it down in rock tunnel.
25	Nanaimo .....	June 2nd.	Oscar Matson..	" .....	Leg broken by fall of coal from face of stall in No. 1 Shaft.
26	Union .....	" 8th.	Da Hee .....	Miner's Helper.	Fatally injured by rock in stall; while the miner was preparing for a post the rock came away.
27	Nanaimo .....	" 27th.	Wm. York ....	Mule Driver...	Leg broken, jammed between a car and a prop while driving in No. 5 Shaft.
28	" .....	" 30th.	J. Greenwall ..	" .....	Leg broken by a loaded trip of cars running down an incline while he was driving a mule in No. 1 Shaft.
29	Wellington ....	July 5th.	Robert Kelly..	Miner .....	Burned by accidental ignition of powder which they were carrying to their work in No. 5 Shaft.
30	" .....	" 5th.	Alex. Hogan ..	" .....	
31	" .....	" 5th.	Thos. Anderson	" .....	
32	Union .....	" 11th.	A Jap .....	Mule Driver...	Kicked by a mule and seriously injured about the head, lost one eye, in No. 5 Shaft.

STATEMENT IN DETAIL OF SUCH ACCIDENTS.—*Concluded.*

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
1898.					
33	Wellington...	Aug. 3rd.	Mike Dolan...	Miner .....	Leg broken by a mule that fell upon him in No. 5 Shaft.
34	"	" 4th.	Moses Nelson..	" .....	Leg broken by a fall of coal from the side, while working in his stall in No. 5 Shaft.
35	Nanaimo .....	" 5th.	D. Boggiano...	" .....	Leg broken by fall of rock in his stall in No. 1 Shaft.
36	Wellington...	" 5th.	W. Cartwright.	Runner .....	Body crushed by a car which got loose from the trip in No. 1 Shaft.
37	Union .....	" 9th.	Alf. Whittle ..	" .....	Fatally injured by a fall of coal and roof in his stall, while in the act of cutting off the end of a stringer to put in place prepared. The coal fell on him in No. 4 Slope.
38	Wellington...	" 19th.	John Davidson.	Fireman .....	Back injured by fall of roof rock in No. 1 Shaft.
39	Nanaimo .....	" 27th.	Jas. Dunbar...	Mule Driver...	Two ribs broken and severely injured on the body by falling off a car whilst in motion, in Protection Island Shaft.
40	Wellington...	Sept. 2nd.	Isaac Portery..	" .....	Arm broken and badly bruised by falling in front of a trip of loaded mine cars in No. 5 Shaft.
41	"	" 26th.	A. O. Booth ..	Miner .....	Burned by an explosion of gas in No. 3 Shaft.
42	Nanaimo .....	Oct. 8th.	Angus McLeod	" .....	Fatally injured by a fall of coal while in the act of mining in his stall, Protection Island Shaft.
43	Wellington...	Nov. 3rd.	Hum Sing.....	Outsider.....	Arm broken by a fall when carrying a prop on pit head in No. 5 Shaft.
44	Union .....	" 7th.	John Kesley ..	Fireman .....	Burned by an explosion of gas in No. 9 stall, No. 12 level, while carrying his naked light, No. 4 Slope.
45	Nanaimo .....	" 12th.	Wm. McGregor	Manager .....	Fatally injured by an explosion of gas in Lamb's incline in No. 1 Shaft.
46	"	" "	Geo. Lee.....	Fireman .....	Fatally injured in the above mentioned explosion.
47	"	" "	Jas. Price.....	" .....	Burned in same explosion.
48	"	" "	Ed. Edmonds..	" .....	" "
49	"	" "	Peter High....	Timberman ..	" "
50	"	" "	Fred'k Hurst..	" .....	" "
51	"	" "	Harry Shepherd	Miner .....	" "
52	"	" "	Don'd Ferguson	" .....	" "
53	"	" "	Morgan Harris.	Fireman .....	Thrown against side of airway by an explosion which followed the above.
54	Wellington...	Dec. 12th.	Harry Blair...	Rope Rider ..	Arm broken and body crushed by a run-away trip of cars caused by the breaking of rope on the incline in No. 5 Shaft.
55	"	" 14th.	John Haigh...	Miner .....	Leg broken by fall of coal when mining in his stall in No. 5 Pit.
56	Union .....	" 15th.	Wm. Alsopp ..	" .....	Slightly injured by a fall of fire clay in No. 4 Slope.

## SUMMARY—SHEWING ACCIDENTS OCCURRING IN V. I. COLLIERIES IN TEN YEARS—1889 TO 1898.

	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	Total for 10 years.
For the year .....											
Output of coal—tons.....	579,830.	678,140.	1,029,097.	826,335.	978,294.	1,012,953.	939,654.	894,882.	892,295.	1,126,531.	8,958,011.
Nature of Injury.											
Cause of Accident.											
Gas explosions .....	1	2	6	2	8	2	2	13	17	1	1
Falls of coal.....	6	3	9	2	8	1	11	2	10	4	16
" rock .....	2	4	2	8	1	2	3	9	18	1	28
Mine cars .....	12	1	13	1	4	1	6	8	2	10	2
" mules .....											
" timber .....											
Hoisting, ropes, &c .....	1										
Powder, &c., explosions.....											
Shot .....	2	1	3								
On surface—miscellaneous..	1										
	4	25	8	37	4	20	4	28	15	48	23

## LIST OF CROWN-GRANTED MINERAL CLAIMS.

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NOTE—A list of the Mineral Claims Crown-granted up to December 31st, 1896, will be found in the Report of this Department for 1896, while the list of those issued in 1897 will be found in the Report for that year.

## CROWN GRANTS ISSUED IN 1898.

## CARIBOO.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Gold Finch . . . . .	Barkerville..	The Oriole Syndicate, Ld . . . . .	42.42	Lot 318, G. 1	28th April, 1898

## EAST KOOTENAY.

Albert . . . . .	Fort Steele..	Pyramid Koot. M. Co., Ld. (For.)	30.45	Lot 609, G. 1	16th June, 1898
Brooks . . . . .	Fort Steele..	Pyramid Kootenay M. Co., Ld .	42.20	" 2126 "	16th " "
Bailey . . . . .	" ..	" ..	41.73	" 2129 "	16th " "
Buckskin . . . . .	Golden . . . .	L. B. Keyser and J. C. H. Joliffe.	19.69	" 1115 "	9th Sept., "
Comstock . . . . .	Fort Steele..	Pyramid Koot. M. Co., Ld. (For.)	46.93	" 610 "	16th June, "
Dorval . . . . .	Fort Steele..	Donald D. Mann . . . . .	29.45	" 2996 "	24th Mar., "
Elkhorn . . . . .	Fort Steele..	A. D. Mitchell . . . . .	48.60	" 2991 "	24th " "
Ellen D. . . . .	Golden . . . .	L. B. Keyser and F. C. H. Joliffe.	14.21	" 1114 "	9th Sept., "
Favourite . . . . .	Golden . . . .	Manuel Dainard <i>et al.</i> . . . . .	49.90	" 1115 "	28th July, "
Good Luck . . . . .	Fort Steele..	Percy C. Andrews . . . . .	23.99	" 2994 "	24th Mar., "
Granite . . . . .	" ..	Pyramid Koot. M. Co., Ld. (For.)	51.65	" 608 "	16th June, "
Harpham . . . . .	Fort Steele..	Pyramid Koot. M. Co., Ld. (For.)	27.61	" 2342 "	16th June, "
Hamlet . . . . .	" ..	Sullivan Group M. Co . . . . .	51.65	" 1386 "	12th Oct., "
Hope . . . . .	" ..	" ..	41.40	" 1387 "	12th " "
Kerin . . . . .	Fort Steele..	Pyramid Koot. M. Co., Ld. (For.)	41.23	" 2341 "	16th June, "
Lake Shore . . . . .	Fort Steele..	Chas. A. Farrell <i>et al.</i> . . . . .	51.53	" 756 "	23rd Mar., "
Maverick . . . . .	Fort Steele..	Neil McL. Curran . . . . .	25.39	" 2995 "	24th " "
Milton . . . . .	" ..	Pyramid Koot. M. Co., Ld. (For.)	50.22	" 2127 "	16th June, "
Mountain Chief . . . . .	" ..	" ..	38.25	" 607 "	16th " "
Pearl . . . . .	Fort Steele..	A. D. Mitchell . . . . .	50.04	" 3035 "	16th April, "
Pyramid . . . . .	" ..	Pyramid Koot. M. Co., Ld. (For.)	37.68	" 2131 "	16th June, "
Stille . . . . .	Fort Steele..	Pyramid Koot. M. Co., Ld. (For.)	42.75	" 2128 "	16th " "
Shylock . . . . .	" ..	Sullivan Group M. Co . . . . .	51.65	" 1385 "	12th Oct., "
Toronto Fract. . . . .	Golden . . . .	John McRae . . . . .	20.56	" 1111 "	15th Nov., "
Wolmer . . . . .	Fort Steele..	Pyramid Koot. M. Co., Ld. (For.)	38.73	" 2125 "	16th June, "
Walsingham . . . . .	" ..	" ..	37.68	" 2130 "	16th " "
Warren . . . . .	" ..	" ..	50.60	" 606 "	16th " "

## WEST KOOTENAY.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Aurora No. 2.....	Slocan.....	The Ruth Mines, Ld.....	42.38	Lot 2030, G. 1	25th Jan., 1898
Aurora Fraction...	".....	".....	10.2	" 2036 "	25th " "
Alwent.....	Trail.....	Almota G. M. Co., Ld. Ly.....	2.5	" 1837 "	25th Feb., "
Alpha.....	Nelson.....	Can. Pacific Exploration, Ld....	30.95	" 2388 "	7th Mar., "
American Girl.....	Slocan.....	The Queen Bess Prop'ty Co., Ld..	44.40	" 2295 "	3rd " "
Annie No. 2.....	Trail.....	Chas. Tetley.....	39.12	" 1747 "	9th " "
Ajax Fraction.....	Slocan.....	Wm. Braden.....	14.20	" 1727 "	26th April, "
Amelia.....	Trail.....	Chas. E. Hope & Jas. S. Johnston	47.49	" 2531 "	22nd " "
Abe Lincoln.....	Trail Creek	Hugh P. Shaw.....	51.65	" 1948 "	14th June, "
Alabama.....	".....	Can. Gold Fields Syndicate, Ld..	30.37	" 1343 "	17th " "
Amazon.....	".....	Kamloops M. & Dev. Co., Ld.....	45.40	" 1612 "	8th July, "
Almeda.....	Ainsworth..	Geo. Alexander and H. D. Wood..	36.50	" 628 "	29th " "
Athabasca.....	Nelson.....	Athabasca G. M. Co., Ld. Ly....	9.10	" 1569 "	29th " "
Algoma.....	".....	".....	45.76	" 1560 "	29th " "
Alberta.....	".....	".....	43.74	" 1561 "	29th " "
April Fool.....	Trail Creek	G. D. Johnston <i>et al.</i> .....	29.3	" 1212 "	6th Aug., "
Almaden.....	".....	Mary E. Rammelmeyer & Frank	15.48	" 2678 "	9th " "
Apex.....	Slocan.....	Geo. W. Hughes.....[J. Walker	44.97	" 1911 "	18th Oct., "
Arena Fraction.....	".....	Chas. E. Hope.....	13.62	" 2539 "	13th " "
Australia.....	Trail.....	Chester Glass.....	34.82	" 2682 "	14th Dec., "
Argenteuil.....	Nelson.....	British America Corporat'n, Ld..	29.55	" 3326 "	27th " "
Atwood.....	Trail.....	B. C. Gold Discovery Co. (For.)..	26.88	" 1231 "	13th Jan., "
Annie Fraction.....	".....	Kootenay-London M. Co. (For.)..	2.89	" 1833 "	16th Feb., "
Bank of England..	Slocan.....	Richard Marpole.....	51.25	" 2214 "	26th Jan., "
Bolus.....	Nelson.....	Leopold Ernest Keller.....	43	" 2123 "	27th " "
Bonita.....	Ainsworth..	Julia A. Wright and F. L. Fitch..	46.20	" 1633 "	2nd Mar., "
Bywater.....	Nelson.....	Philip White.....	44.48	" 2391 "	23rd " "
Blizzard.....	Slocan.....	Edwin H. Tomlinson and Wilbur			
		A. Hendryx.....	2.04	" 1849 "	18th April, "
Big Bend Belle....	Revelstoke..	London and B. C. Alliance Syn..	50.86	" 2499 "	6th May, "
Bear Fraction.....	".....	".....	17.74	" 2500 "	6th " "
Boundary No. 1....	Trail Creek	Geo. Willard & Jno. H. McDonald	51.65	" 1944 "	26th April, "
Baby Ruth.....	Slocan.....	Eleanor J. Kendall and A. R.			
		Fingland.....	51.65	" 2229 "	20th " "
Butterfly.....	Trail Creek	B. C. Rossland and Slocan Syn, Ld	33.12	" 1675 "	12th May, "
Black Knat Frac...	Slocan.....	Dom. Mines, Ld.....	8.44	" 2490 "	18th June, "
Boadicea.....	Ainsworth..	Carbonate Silver Mining Co.....	51.65	" 1961 "	18th " "
Bunker Hill.....	Trail Creek	Jno. R. Reavis <i>et al.</i> .....	43.61	" 2939 "	18th " "
Beaver.....	Slocan City	Lucky George Mining Co.....	40.47	" 2407 "	28th July, "
Bell.....	Trail Creek	Chas. G. Major.....	9.5	" 1866 "	18th June, "
Black Hawk No. 2..	".....	Robert Miller.....	51.65	" 2941 "	11th July, "
Black Canon.....	".....	Kamloops Mining and Develop-			
		ment Co., Limited Liability....	49.21	" 1611 "	8th " "
Black Hills.....	Ainsworth..	Black Hills Mining Co. of B. C.,			
		Limited Liability.....	47.18	" 1892 "	8th " "
Blue Bird No. 3...	Trail Creek	J. S. Colton Fox and C. Sweeny..	51.65	" 1454 "	8th Aug., "
Big Chief.....	".....	".....	39.88	" 1456 "	8th " "
Badger State.....	Slocan.....	George Alexander.....	33.75	" 2033 "	8th " "
Baltic Fraction.....	Trail Creek	Brit. America Corporation, Ld..	82	" 2394 "	11th " "
Blue Peter.....	Slocan.....	The Comstock Mines, B. C., Ld..	6.4	" 1816 "	11th " "
Butte.....	Trail Creek	Virginia Gold M. Co. (For.).....	1.78	" 2395 "	12th " "
Black Diamond.....	Trail.....	J. S. Colton Fox and C. Sweeny..	30.25	" 1444 "	24th " "
Bullion.....	Nelson.....	Alf Gold Mining Co., Limited..	47.19	" 2190 "	30th " "
Blackberry.....	Trail Creek	Henry B. Smith.....	39.89	" 1637 "	11th Oct., "
Belmont.....	Trail.....	Adelia Stussi.....	26.3	" 1491 "	23rd Dec., "
Banner Hill.....	".....	B. C. Rossland & Slocan Syn., Ld	8.28	" 3286 "	15th " "
Blue Chip.....	".....	E. S. Topping.....	48.52	" 1698 "	16th " "
Blackcock.....	Nelson.....	Alex. Audet and A. Julian.....	40.10	" 2922 "	28th " "
Belle.....	".....	J. A. Quinlan.....	42	" 2461 "	28th Jan., "
Black Pearl.....	Trail.....	John G. Dickson.....	26	" 1834 "	16th Feb., "
Bolander.....	Slocan.....	Jas. F. Leahy.....	51.65	" 2143 "	25th Mar., "
Charleston.....	Ainsworth..	The Charleston Mining Co., Ld..	37.44	" 2091 "	28th Feb., "
Comstock.....	Slocan.....	Comstock Mines, B. C., Ld.....	46.46	" 1814 "	28th July, "
Concord.....	".....	The Queen Bess Prop'ty Co., Ld..	40.80	" 2293 "	3rd Mar., "

WEST KOOTENAY.—*Continued.*

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
C. O. D. ....	Revelstoke.	London and B. C. Alliance Syn...	50.41	Lot 2653, G. 1	6th May, 1898
Confederation ....	Trout Lake.	Lillooet, Fraser River and Cariboo Gold Fields, Ltd. ....	32.81	" 2868 "	18th April, "
Copper Bell .....	Trail Creek.	Waneta & Trail C. G. M. Co., Ltd.	51.45	" 2185 "	26th " "
Copper Glance ....	"	"	41.40	" 2183 "	" " "
Copper .....	"	"	40.61	" 2184 "	" " "
Contact .....	"	Jonathan W. Cruthers .....	50.4	" 1865 "	" " "
Celia .....	"	C. E. Hope and Jas. S. Johnston.	15.71	" 1670 "	22nd " "
Copper Crown .....	Illecillewaet.	Fish River Copper & Silver M. Co.	51.65	" 2783 "	28th Nov., "
Copper Hill .....	"	"	51.65	" 2780 "	" " "
Chatham .....	Slocan .....	John McQuillan .....	49.92	" 2493 "	18th June, "
Comiskey .....	"	Galena Mines, Ltd. (For) .....	32.25	" 1391 "	29th July, "
Crouch Hall .....	Nelson .....	Alf Gold Mining Co., Ltd. Lty.	18.40	" 2189 "	30th Aug., "
Convention Frac. ....	Slocan .....	Albert Behne and A. E. Fauquier.	44.53	" 2288 "	12th Dec., "
Crescent .....	"	Chas. E. Hope .....	18.17	" 2540 "	13th Oct., "
Copper Fraction .....	Illecillewaet.	Fish River Copper & Silver M. Co.	33.75	" 2781 "	16th Nov., "
Cliff .....	Slocan .....	Evelyn M. Sandilands .....	18.85	" 2606 "	20th Dec., "
Cliff Fraction .....	"	"	4.43	" 2608 "	" " "
Conductor .....	"	Wm. H. Elson .....	29.61	" 1251 "	" " "
Cazabazua Fraction	"	Kootenay (B. C.) Exploring and Mining Co., Ltd. ....	5.37	" 1809 "	8th Jan., "
Colorado .....	Ainsworth ..	Henry Hulbert .....	38.	" 1476 "	11th " "
Comet No. 2 .....	Trail .....	Kootenay London Mining Co. ....	36.19	" 1932 "	14th " "
Deadwood .....	Nelson .....	Wm. Moore .....	37.87	" 2232 "	11th Feb., "
Daylight .....	Trail .....	Edwd. Baillie .....	33.72	" 1963 "	1st March, "
Defender .....	Ainsworth ..	Geo. Alexander <i>et al.</i> .....	31.41	" 2827 "	20th April, "
Deerslayer .....	Slocan .....	Lucy A. Shaw .....	51.65	" 2491 "	13th June, "
Death's Head .....	Ainsworth ..	Columbia M. Co., Vic., B. C., Ltd.	31.6	" 2178 "	14th " "
Dunedin .....	Slocan .....	Thos. Brown and Jas. Marshall ..	17.10	" 1853 "	29th July, "
Derby .....	"	A. H. Buchanan .....	14.21	" 1855 "	12th " "
Durham Fraction .....	Trail .....	Thos. Dunn .....	13.66	" 1126 "	24th Aug., "
Duphunnie .....	"	F. McL. McIvor Campbell .....	8.23	" 2116 "	30th " "
Dew Drop Fraction	"	Thos. Lapslie .....	7.98	" 1647 "	29th " "
Duluth .....	"	F. A. Heinze .....	24.36	" 2974 "	27th Dec., "
Eagle No. 2 .....	Slocan .....	Peter McLaren and Wm. A. Allen	51.65	" 2328 "	26th Feb., "
Epoch .....	Nelson .....	Franklin Riffle .....	41.5	" 2459 "	24th " "
Emily .....	"	Herbert J. Wilson .....	51.65	" 2020 "	2nd March, "
E. V. Debbs .....	Trail .....	Wm. Murphy .....	23.95	" 2673 "	4th " "
Emma .....	Nelson .....	Price McDonald <i>et al.</i> .....	11.50	" 2306 "	19th April, "
Evening Star .....	Slocan .....	Jas. W. Ryan and Chas. Neuham	51.65	" 1584 "	21st " "
Enterprise .....	Trail .....	Chas. E. Hope & Jas. S. Johnston	51.08	" 1668 "	22nd " "
Excelsior .....	"	"	35.52	" 1669 "	" " "
Edinburgh .....	Illecillewaet.	Fish R. Copper & Silver M. Co., Ltd.	20.61	" 2867 "	1st Dec., "
Elizabeth .....	"	"	20.66	" 2785 "	" " "
East Lanark Frac. ....	Revelstoke.	Lillooet, F. R. & Cariboo G. F., Ltd.	1.94	" 2777 "	17th Dec., "
Evening .....	Trail Creek.	Eureka Consol. Mg. Co. (For) ...	28.91	" 947 "	16th June, "
Earl .....	Ainsworth ..	D. F. Strobeck <i>et al.</i> .....	46.38	" 1436 "	28th June, "
Emerson .....	"	DeRoy S. Carriel .....	40.04	" 1437 "	" " "
Elpro .....	Nelson .....	Pine Ridge Gold M. Co., Ltd. Ly.	51.65	" 2528 "	" " "
Ella .....	Trail Creek.	Kamloops Min. & Devel. Co., Ltd.	46.04	" 1613 "	8th July, "
Elkhorn .....	Slocan .....	Jno. W. Stewart .....	43.65	" 859 "	4th Aug., "
Esmeralda Fraction	Trail Creek.	Edgar Gold Min. & Smelting Co.	15.45	" 2980 "	11th " "
Excelsior Fraction.	Trout Lake.	Sunshine, Limited .....	3.42	" 2625 "	19th " "
Eastern King .....	"	Angus McNish .....	51.65	" 1820 "	" " "
Emu .....	Trail .....	F. McL. McIvor Campbell .....	50.53	" 2115 "	30th " "
Emu Fraction .....	"	"	15.	" 2121 "	" " "
Emily Edith .....	Slocan .....	Chas. E. Hope .....	36.55	" 2532 "	13th Oct., "
East Columbia	Trail Creek.	B. C. (Rossland & Slocan) Syn., Ltd.	1.92	" 3287 "	15th Dec., "
Mountain Frac. ....	"	"	"	"	"
Election .....	Nelson .....	Nelson Poorman Gold M. Co., Ltd.	40.91	" 2559 "	29th " "
Elvira .....	Slocan .....	G. D. McMartin & T. P. Durham	51.65	" 3155 "	12th " "
Fourth of July ....	Ainsworth ..	Columbia M. Co., Vic., B. C., Ltd.	33.63	" 2052 "	3rd March, "
Fairford .....	Trail .....	H. L. A. Keller <i>et al.</i> .....	15.72	" 1223 "	5th " "

## WEST KOOTENAY.—Continued.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
First Extension	Slocan	The Queen Bess Prop. Co., Ltd.	31.20	Lot 2294, G. 1	3rd M'ch., 1898
Four Hundred	Trail Creek	Chas. Tetley	51.65	" 1838 "	9th " "
Fanny	Nelson	Julius Peterson	48.30	" 1986 "	28th April, "
Fidelity	Slocan	Frank L. Byron <i>et al.</i>	33.04	" 2411 "	9th June, "
Fred	Trail Creek	Arthur Going, Jas. C. Rodgers, and Ernest Kennedy	10.00	" 2676 "	7th " "
Free Coinage	"	Thos. B. Garrison <i>et al.</i>	48.5	" 1945 "	12th Aug., "
Fraction No. 2	Ainsworth	Campbell Sweeny	.80	" 725 "	11th Nov., "
Fandango	Trail Creek	Jno. W. Heisner	51.28	" 3128 "	27th Dec., "
Freddie B.	Trail	Mary Ann L. Archer	36.03	" 1780 "	13th Jan., "
Gray Cliff	Trail Creek	Eugene Sayre Topping	39.48	" 2470 "	27th Jan., "
Golden Butterfly Fr.	"	Andrew W. Provand	11.29	" 1943 "	26th Feb., "
Great Boulder Frac.	Nelson	Herbert J. Wilson	17.19	" 2022 "	2nd March, "
Good Luck	Ainsworth	Julia A. Wright and F. L. Fitch	40.68	" 1684 "	" " "
Grand Prize	Trail	Chas. Litchfield	44.39	" 933 "	1st " "
Gold Bar	"	Geo. W. McBride	51.	" 1952 "	4th " "
Gold Hill Frac.	Revelstoke	London and B. C. Alliance Syn.	7.63	" 2654 "	6th May, "
Great Western Frac.	Trout Lake	Hugh McPherson <i>et al.</i>	.61	" 1102 "	10th " "
Great Northern	"	"	24.82	" 1099 "	9th " "
Great Eastern Frac.	"	"	.05	" 1103 "	10th " "
Galena Bank	Slocan	Eleanor J. Kendall and A. R. Finland	48.60	" 2230 "	20th April, "
Good Hope	Trail Creek	Good Hope M. & M. Co., Ltd. Ly.	23.39	" 1045 "	18th June, "
Gem	Slocan	Ramsdell M. & M. Co. (For)	6.40	" 1858 "	28th " "
Gladiator	Trail Creek	A. B. Railton	51.65	" 2940 "	9th July "
Gold Hunter	"	Can. Gold Fields Syn., Ltd.	46.73	" 1342 "	5th Aug., "
G. B. Architect Frac.	"	Fritz A. Heinze	27.54	" 1707 "	9th " "
Gold Dollar No. 1	"	Richard A. Power	48.44	" 2981 "	10th " "
Green Crown	"	Wm. L. Raph	13.79	" 1232 "	20th Oct., "
Grey Eagle	Slocan	Byron N. White	13.11	" 2137 "	27th Dec., "
Great Eastern	"	Joseph Eaton	28.08	" 2289, A 1	11th Jan., "
Hardscrabble	Nelson	Nelson Poorman Gold M. Co., Ltd.	20.66	" 102, G. 1	27th Jan., "
Huron	"	Herbert J. Wilson	51.65	" 2019 "	2nd March, "
Halton Chief	Slocan	Edwin S. Graham	23.08	" 2158 "	27th April, "
Hope	Lardeau	B. C. Smelting and Refining Co.	51.65	" 1706 "	28th " "
Hillside	Trout Lake	Hugh McPherson <i>et al.</i>	39.17	" 1098 "	9th May, "
Hill Top Fraction	Slocan	Geo. Sleeman & Jas. C. Kelcher	.83	" 2849 "	20th April, "
Howard	Ainsworth	Geo. Alexander <i>et al.</i>	22.63	" 2828 "	" " "
Humming Bird	"	Jno. McQuillan	51.48	" 2811 "	18th June, "
Hamburg	"	Macleod Gold & Silver M. Co., Ltd.	22.18	" 2829 "	13th " "
Humbolt	Slocan	Wm. H. Hellyer	17.55	" 2228 "	18th " "
Hinkeley	"	Hinckley & Black Colt M. Co.	45.09	" 1720 "	22nd Aug., "
Hustler	"	Silver Hustler Mining Co.	13.	" 1888 "	20th " "
Hotstufh	Trail Creek	F. McI. McIvor Campbell	8.13	" 2120 "	30th " "
Hauser Fraction	Ainsworth	C. R. Tryon	.84	" 2009 "	15th Nov., "
Hauser	"	Thos. A. Skilliter <i>et al.</i>	48.43	" 2008 "	9th " "
Hendryx No. 3	"	Campbell Sweeny	19.	" 723 "	" " "
Hawkeye	Nelson	British America Corporation, Ltd.	21.20	" 3327 "	27th Dec., "
Hazel	"	Howard Williams	38.90	" 2639 "	" " "
J. C.	Ainsworth	R. C. Campbell Johnston	17.05	" 2283 "	29th Jan., "
Ida May	Trail	Red Mountain Ida May Gold Mining Co., Ltd. Ly	22.30	" 1940 "	3rd March, "
Inverness	Slocan	John Brown <i>et al.</i>	36.	" 2291 "	23rd " "
Innisfail	Slocan City	Lucky George Mining Co.	40.35	" 2405 "	28th July, "
Isabel Fraction	Slocan	The Comstock Mines, B. C.	15.48	" 1817 "	11th Aug., "
Imperial	Nelson	Geo. F. Whiteman	37.43	" 3025 "	12th Nov., "
Iron Colt Fraction	Trail	Thos. B. Garrison	.40	" 1140 "	13th Dec., "
Jack	Slocan City	Wm. Caldwell	57.45	" 1801 "	10th March, "
Jennie	Ainsworth	Can. Gold Fields Syn., Ltd.	35.83	" 2638 "	28th June, "
Jeff Davis	Trail Creek	Thos. B. Garrison <i>et al.</i>	51.65	" 1946 "	11th Aug., "
J. I. C.	Slocan	Chas. E. Hope	38.22	" 2533 "	13th Oct., "
Jenny Jones	"	"	22.30	" 2534 "	" " "

## WEST KOOTENAY.—Continued.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
J. M. B. ....	Nelson .....	Hall Mines, Ld. ....	8.60	Lot 902, G. 1	10th Nov., 1898
Jumbo No. 3. ....	Trail Creek ..	New York Kootenay Mining Co.	2.81	" 3218 "	15th " "
Jumbo No. 3 Frac. ..	" ..	" ..	2.40	" 3030 "	15th " "
Keystone .....	Slocan .....	J. D. Ryan and Neuham. ....	36.15	" 1585 "	27th April, "
Kesef. ....	Revelstoke ..	London & B. C. Alliance Syn., Ld.	48.89	" 2669 "	6th May, "
Katie D. ....	Slocan .....	Geo. Sleeman and J. C. Ketcher.	24.16	" 2848 "	20th April, "
King Solomon. ....	Ainsworth ..	King Solomon Consol. Min. Co..	20.39	" 2332 "	29th " "
Kesef. ....	Slocan .....	Lucy A. Shaw .....	19.60	" 2492 "	13th June, "
Keystone .....	Ainsworth ..	James A. Mitchell .....	28	" 2179 "	28th " "
Kalanish .....	Nelson .....	Pine Ridge G. M. & M. Co., Ld..	51.65	" 2526 "	28th " "
Kaiser. ....	Slocan .....	Wm. Lardner .....	50	" 1254 "	4th Aug., "
Key Fraction. ....	Ainsworth ..	Vancouver Meteor Min. Co., Ld.	2.62	" 2506 "	10th " "
Kentucky Girl .....	Slocan .....	The Comstock Mines, B. C., Ld..	37.74	" 1818 "	11th " "
Keno .....	" ..	W. Perry Russell .....	41.10	" 530 "	30th " "
Kurrajong .....	Trail Creek ..	F. McL. McIvor Campbell .....	26.63	" 2117 "	30th " "
Kinkora .....	Slocan .....	Mary E. Bragdon <i>et al.</i> .....	7.95	" 2104 "	21st Dec., "
Lizzie B .....	Nelson .....	Canadian Pacific Explo. Co., Ld.	35.70	" 2386 "	24th Feb., "
Lauder .....	Trail .....	W. Kirkpatrick <i>et al.</i> .....	32.86	" 1962 "	26th " "
Lulu .....	" ..	Dollarocracy Mg. & Sm. Co., Ld.	33.29	" 2473 "	28th " "
Last Chance. ....	Nelson .....	Herbert J. Wilson .....	51.32	" 2021 "	2nd Mar., "
Lake View No. 8. ....	Slocan City ..	Wm. Caldwell .....	51.65	" 1802 "	10th " "
Little Widow Frac. ..	Slocan .....	Edwd. H. Tomlinson and Wilbur A. Hendryx .....	11.15	" 1850 "	18th April, "
Lake Fraction. ....	Revelstoke ..	London and B. C. Alliance Syn..	25.60	" 2662 "	6th May, "
Lucy .....	Ainsworth ..	E. R. Wingate .....	20.65	" 2329 "	29th April, "
Last Chance. ....	" ..	Thos. McGovern .....	20.66	" 2233 "	27th " "
Lillian No. 4. ....	Slocan .....	Slocan Reciprocity Co. (For.) ..	35.30	" 1724 "	22nd " "
Lincoln No. 1. ....	Trail Creek ..	B. C. (Rossland and Slocan) Syn	34.27	" 1931 "	12th May, "
Linnet Fraction. ....	Ainsworth ..	Jno. McMillan .....	2.16	" 2813 "	18th June, "
Little Joe. ....	Arrow Lake ..	Columbia & Cariboo G. M. Co., Ld.	35.05	" 2728 "	10th " "
Lady of the Lake. ....	Ainsworth ..	McLeod Gold and Silver Min. Co.	12.02	" 2829 "	13th " "
Little Mamie. ....	" ..	McLeod Gold and Silver Min. Co.	3.05	" 2830 "	13th " "
Lady Jane .....	Slocan .....	Jas. M. Dunn & A. H. Buchanan	20.66	" 1305 "	16th " "
Lucky George. ....	Slocan City ..	Lucky George Mining Co. ....	39.33	" 2406 "	28th July, "
Laurence Fraction. ....	Nelson .....	London & B. C. Gold Fields, Ld. (For.) .....	7.02	" 2303 "	18th " "
Lallah Rook .....	Slocan .....	Ed. Mahon .....	10.94	" 1856 "	11th " "
Lookout .....	Trail .....	Lookout Min. and Mill. Co. (For.)	4.13	" 643 "	17th Nov., "
Lorna Doone .....	Slocan .....	Frank Culver .....	51.10	" 1401 "	19th Dec., "
Little Jim .....	Trail .....	Little Jim G. M. & M. Co. (For.)	7.36	" 2685 "	14th " "
Lone Jack .....	Slocan .....	Edward H. Tomlinson .....	14.02	" 2633 "	27th " "
Mexico .....	Ainsworth ..	Kaslo Montezuma M. & M. Co. (F.)	20.54	" 2042 "	24th Feb., "
Montezuma .....	" ..	" ..	20.03	" 2041 "	24th " "
Muldoon .....	Nelson .....	M. C. Monaghan <i>et al.</i> .....	20.40	" 976 "	7th Mar., "
Midnight Fraction. ....	Slocan .....	Adams B. C. Co., Ld. ....	26	" 2292 "	23rd " "
Mountain Goat No. 2 ..	Ainsworth ..	Alex. T. Garland <i>et al.</i> .....	38.37	" 629 "	10th " "
Mountain .....	Trout Lake ..	Sunshine, Limited .....	51.65	" 2626 "	29th April, "
Marion .....	Slocan .....	Geo. Alexander <i>et al.</i> .....	28.91	" 2287 "	27th " "
Michigamie .....	Trail Creek ..	B. C. Rossland & Slocan Syn., Ld	13.21	" 1294 "	12th May, "
Molly Fraction. ....	Arrow Lake ..	Columbia and Cariboo G. M. Co.	5.96	" 2729 "	10th June, "
Molly .....	" ..	" ..	51.65	" 2727 "	10th " "
Mormon Girl. ....	Trail Creek ..	Jno. R. Reavis <i>et al.</i> .....	43.61	" 1949 "	18th " "
Mary D .....	" ..	Jno. R. Stussi .....	38.82	" 1514 "	18th " "
Mispickel .....	" ..	Adelia Stussi <i>et al.</i> .....	34.27	" 1761 "	18th " "
Moonshine .....	Ainsworth ..	Victoria Min. & Devel. Co., Ld..	33	" 1881 "	28th " "
M. P. Fraction. ....	Nelson .....	Pine Ridge Gold Mining Co., Ld.	17.45	" 2529 "	28th " "
Modena .....	Trail Creek ..	Edgar Gold Mining Co. ....	13.21	" 1694 "	18th " "
Manitoba .....	Nelson .....	Athabasca Gold Mining Co., Ld..	38.82	" 1572 "	29th " "
Mammoth .....	Slocan .....	Alf. W. McCune .....	27.48	" 1910 "	8th Aug., "
Morning Star No. 1 ..	Trail Creek ..	The B. C. Smelting & Refin'g Co.	44.44	" 2976 "	10th " "
Myrtle R. ....	Ainsworth ..	The Whitewater Mines, Ld. (For )	20.09	" 1418 "	10th " "
Mogul .....	Trail .....	Delaware Min. & Mill. Co. (For.)	41.23	" 1789 "	12th Jan., "
Meteor .....	Ainsworth ..	Vancouver Meteor Min. Co., Ld.	15.38	" 2501 "	10th Aug., "



## WEST KOOTENAY.—Continued.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Mountain Fraction.	Trout Lake	Sunshine, Limited	.36	Lot 3052, G. 1	19th Aug., 1898
Mohawk	Nelson	Alf Gold Min. Co., Ltd.	33.92	" 2187 "	30th " "
Mineral Hill	Trail Creek	Sault St. Marie Gold M. Co., Ltd.	10.53	" 3020 "	19th Oct. "
Mugwump	"	Mugwump Gold Mining Co., Ltd.	15	" 963 "	11th " "
Midas	Nelson	W. J. Goepel, Geo. Alexander, and M. S. Davys	50.29	" 3135 "	11th Nov. "
Mocking Bird	Slocan	Granville Mining Co., Ltd.	20.02	" 1265 "	16th " "
Mollie Hughes	"	Mary E. Bragdon <i>et al.</i>	36.61	" 2106 "	21st Dec. "
Nighthawk Frac.	Slocan	Geo. Alexander	25.26	" 2032 "	26th Jan. "
Nancy Hanks	Trail	Chas. Tetley	11.96	" 1787 "	9th Mar. "
N. P.	"	"	49.79	" 2671 "	9th " "
Napier	Slocan	Vancouver Group Mining Co., Ltd.	46.56	" 2299 "	23rd " "
Northern Light	Trout Lake	Hugh McPherson <i>et al.</i>	43.49	" 1101 "	10th May, "
Northland	"	"	48	" 1100 "	10th " "
Naoma Fraction	Slocan	Dominion Mines, Limited	4.77	" 2519 "	10th June, "
Nako	Nelson	Pine Ridge G. M. & M. Co., Ltd.	45.70	" 2527 "	28th " "
Nora Fraction	"	J. R. Robertson	2.89	" 2301 "	18th " "
Nick of Time	Trail	Fredk. P. Gutellius	17.96	" 1173 "	5th Aug. "
Newton Will	Trail Creek	Sault St. Marie Gold M. Co., Ltd.	33.09	" 3022 "	19th Oct. "
New Deadwood	"	"	49.05	" 3019 "	19th " "
Nettie Fraction	Slocan	Vancouver & B. C. Gen. Explor. Co., Ltd. (For.)	1.84	" 1249 "	15th Nov. "
Nil Desperandum	Ainsworth	Wm. R. Angus	37.33	" 2806 "	16th " "
North Columbia Fra	Trail Creek	B. C. Rossland & Slocan Syn., Ltd.	32.31	" 3285 "	14th Dec. "
Noonday	Slocan	Byron N. White	50.80	" 2136 "	27th " "
Northern	Trail	Victor Mounier	33.34	" 1783 "	25th Mar. "
Ontario	Ainsworth	Wm. Braden	20.55	" 1725 "	7th " "
O. K.	Slocan	E. S. Graham and Ad. Hellmers.	42.70	" 2156 "	26th April, "
Ole Bull	Revelstoke	London and B. C. Alliance Synd.	51.65	" 2497 "	6th May, "
Ole Bull Fraction	"	"	20.33	" 2498 "	6th " "
O. K. Fraction	Trail Creek	A. Provand	1.23	" 2675 "	26th April, "
Oxford	"	J. B. Chantrell <i>et al.</i>	8.43	" 1935 "	9th June, "
Orphan Boy	Revelstoke	C. N. Davidson	51.65	" 2663 "	28th " "
Oriental	Trail Creek	Montreal and B. C. Prospecting and Promoting Co.	37.83	" 1701 "	8th Aug. "
Ocean	Slocan	D. W. Moore and Jas. Waugh	39.32	" 1723 "	20th Dec. "
Ophir No. 1	Trail Creek	C. O. Wickenden	37.67	" 3120 "	16th " "
Olympia	Trail	Delaware Min. & Mill. Co. (For.)	51.04	" 1788 "	12th Jan. "
Porto Rico	Nelson	Canadian Pacific Exploration, Ltd.	51.65	" 2385 "	24th Feb. "
Portland	Trail	Sir Chas. Tupper & C. Ashworth	45.43	" 2523 "	1st Mar. "
Pete	"	Dollarocracy Min. & Sm. Co., Ltd.	35.17	" 2472 "	28th Feb. "
Primrose Fraction	"	Early Bird Gold Mining Co., Ltd.	7	" 459 "	1st Mar. "
Princess	Nelson	Albert J. Gerrard	44.22	" 2023 "	24th " "
Pearl	Trail	Edmond Haney <i>et al.</i>	.82	" 2392 "	4th " "
Pay Rock	Slocan	Ed. S. Graham and Ad. Helmers.	39	" 2157 "	27th April, "
Pelly	"	Vancouver Group Min. Co., Ltd.	42.84	" 2298 "	23rd " "
Pilgrim	Trail	Thos. L. Savage <i>et al.</i>	21.90	" 972 "	23rd " "
Penobsquis	Trail Creek	Chas. Nelson <i>et al.</i>	23.36	" 2530 "	18th June, "
Pountney Fraction	Nelson	J. R. Robertson	10.11	" 2302 "	18th " "
Pink	Trail Creek	Look-out Mountain Min. Co., Ltd.	31.05	" 2975 "	18th " "
Picton	Nelson	The Picton Develop. Synd., Ltd.	E 24.38 W 16.10	3134	31st Aug. "
President	Ainsworth	Thos. A. Skilliter <i>et al.</i>	51.65	" 2006 "	9th Nov. "
President Fraction	"	"	11.32	" 2007 "	9th " "
Pinto	Slocan	Mary E. Bragdon	51.65	" 2107 "	21st Dec. "
Prior	"	Frank Culver	36.10	" 1402 "	22nd " "
Peerless	Slocan City	Henry B. Boie	41.78	" 1812 "	14th Jan. "
Ricardo	Slocan	Vancouver Group Min. Co., Ltd.	50.90	" 2300 "	23rd Mar. "
Revenue	Ainsworth	Geo. Alexander <i>et al.</i>	35.98	" 2826 "	20th April, "
Reciprocity	Slocan	Slocan Reciprocity Mg. Co. (For.)	18.01	" 1722 "	22nd " "
Robin	Ainsworth	John Macquillan	46.28	" 2509 "	18th June, "
Ruby Fraction	Nelson	Athabasca Gold Mining Co., Ltd.	1.03	" 1573 "	29th Aug. "

## WEST KOOTENAY.—Continued.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Red Bird .....	Trail Creek.	Jno. S. Colton Fox & C. Sweeny.	49.27	Lot 1455, G. 1	8th Aug., 1898
Romeo .....	"	Thos. R. Morrow <i>et al.</i>	51.10	" 1930 "	19th " "
Rutland .....	"	Sault St. Marie Gold M. Co., Ltd.	28.43	" 3021 "	19th Oct., "
Reubenstein .....	"	Olga T. Merryweather.	44.49	" 1120 "	22nd Nov., "
Ruby Trust .....	Slocan .....	The Comstock Mines (B. C.), Ltd.	47.49	" 1804 "	12th Oct., "
Rawdon .....	"	Jas. L. Montgomery <i>et al.</i>	10.	" 855 "	20th Dec., "
Real Idea No. 2 .....	"	Mary E. Bragdon <i>et al.</i>	51.37	" 2105 "	21st " "
Rosa .....	Nelson .....	J. A. Coryell, Alex. Goyette, and J. A. Quinlan.	48.13	" 2460 "	28th Jan., "
Royal George .....	Trail .....	J. A. Coryell, Alex. Goyette, and J. A. Quinlan.	33.29	" 1199 "	14th " "
Suburban Fraction.	Slocan .....	The Ruth Mines, Ltd.	10.02	" 2031 "	25th " "
St. Croix .....	Trail Creek.	Ben. Perkins and E. S. Topping.	28.94	" 1703 "	27th " "
Sultan .....	Nelson .....	Franklin Riffle	16.09	" 2458 "	24th Feb., "
Sunset No. 3 .....	Trail .....	Almota Gold Mining Co., Ltd.	50.39	" 1835 "	25th " "
Star .....	Ainsworth .....	D. F. Strobeck and J. R. Hardie	51.65	" 1438 "	26th " "
Silver Cup .....	Slocan .....	Comstock Mines (B. C.), Ltd.	50.97	" 1815 "	28th July, "
Silver Chief .....	"	"	39.46	" 1813 "	" " "
Skylark .....	Ainsworth .....	The Adams (B. C.) Co., Ltd.	16.28	" 1685 "	7th March, "
Sound Money .....	Trail .....	Chas. Tetley.	23.60	" 2672 "	9th " "
Silver Star .....	Slocan .....	Vancouver Group Mining Co., Ltd.	37.58	" 2297 "	23rd " "
Silver Cord .....	"	E. H. Tomlinson & W. A. Hendryx	7.17	" 1848 "	18th April, "
Silver Cup Fraction	Trout Lake.	Sunshine, Limited	3.67	" 2622 "	8th June, "
St. Laurence .....	Trail Creek	E. J. Noel <i>et al.</i>	30.97	" 1197 "	28th April, "
Sarah B .....	Slocan .....	Geo. Sleeman and J. C. Kelcher	51.	" 2847 "	20th " "
Snowflake .....	"	E. H. Applewhaite & F. W. Hunt	18.84	" 1847 "	27th " "
Scotia .....	Illecillewaet.	Fish River Copper & Silver M. Co.	20.66	" 2784 "	1st Dec., "
Santa Cruz .....	Trail Creek	B. C. Rossland & Slocan Syn., Ltd.	38.58	" 1676 "	12th May, "
St. Thomas .....	"	J. B. Chantrell <i>et al.</i>	46.99	" 1933 "	9th June, "
Snow Slide .....	Nelson .....	Robt. F. Dodd	51.65	" 2679 "	14th " "
Skylark Fraction .....	Ainsworth .....	Jno. MacQuillan	6.29	" 2512 "	18th " "
Sincher .....	Slocan .....	Alf. W. McCune <i>et al.</i>	9.14	" 1303 "	16th " "
Sappiro .....	"	Ramsdall Min. & Mill. Co. (For.)	18.58	" 1857 "	28th " "
Sunset No. 2 .....	Trail Creek	Canadian Gold Fields Syn., Ltd.	36.18	" 954 "	17th " "
Sir Charles .....	Ainsworth .....	Geo. Alexander & Hiram D. Wood	51.65	" 627 "	29th " "
Silver Bell .....	Slocan .....	Silver Hustler Mining Co.	32.20	" 1887 "	20th Aug., "
Sutton .....	Illecillewaet.	Lanark Con. Min. & Sm. Co., Ltd.	20.66	" 2601 "	24th " "
Silver Bear .....	Ainsworth .....	Silver Bear Min. & Concent'g Co.	46.38	" 1781 "	12th Jan., "
Silverton Boy .....	Slocan .....	Chas. E. Hope	36.95	" 2536 "	13th Oct., "
Seneca Fraction .....	Trail Creek	Abraham B. Irwin	.05	" 2403 "	10th " "
Snow Water .....	Nelson .....	W. J. Goepel and A. J. Marks	20.66	" 3137 "	22nd Nov., "
Stemwinder .....	Trail Creek	Ernest Kennedy	30.44	" 1498 "	23rd Dec., "
Superior No. 3 .....	Trail .....	Superior Gold Mining Co., Ltd.	17.55	" 1623 "	22nd Jan., "
Titanic .....	Nelson .....	Franklin Riffle	48.90	" 2455 "	24th Feb., "
Tuesday .....	Trail .....	Willis A. Ritchie	32.27	" 1278 "	26th April, "
Triangle .....	Nelson .....	Athabasca Gold Mining Co., Ltd.	1.65	" 1574 "	29th June, "
Timber .....	Trail Creek	Wm. J. Harris	12.79	" 2684 "	9th Aug., "
Tennie C .....	Ainsworth .....	The Whitewater Mines, Ltd.	17.02	" 1419 "	10th " "
Two Brothers .....	"	Thos. A. Skilliter	30.58	" 2005 "	9th Nov., "
Tootsie .....	Trail Creek	British America Corporation, Ltd.	43.	" 3325 "	12th Dec., "
Tryon .....	Slocan .....	Mary E. Bragdon	44.69	" 2108 "	21st " "
Treadwell .....	Trail .....	Jno. A. Smith and Alex. Gibson.	27.81	" 1194 "	16th " "
Tennessee .....	Nelson .....	Hamilton & Rossland G. M. Co.	33.53	" 1317 "	10th March, "
U. B .....	"	Wm. H. Sherrod	24.50	" 2018 "	4th " "
U. S. No. 2 .....	Trail Creek	John D. Hinkle	41.87	" 1964 "	18th June, "
Velvet Fraction .....	Trail .....	Sir Chas. Tupper & C. Ashworth	39.85	" 2521 "	1st March, "
Vancouver Fraction	Slocan .....	Vancouver Group Mining Co., Ltd.	.13	" 2900 "	23rd " "
Vancouver .....	Ainsworth .....	Vancouver Meteor Min. Co., Ltd.	33.03	" 2502 "	10th Aug., "
Vernon .....	Trail Creek	Ross Thompson	1.03	" 1044 "	13th Dec., "
Vulcan No. 2 .....	Trail .....	J. D. Farrell and Jno. F. Reddy.	51.65	" 1228 "	5th April, "
Wyoming .....	Slocan .....	The Ruth Mines, Limited	37.35	" 754 "	26th Jan., "
War Eagle .....	Arrow Lake.	Geo. Alexander <i>et al.</i>	32.19	" 2583 "	2nd March, "

WEST KOOTENAY.—*Concluded.*

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Willcock .....	Nelson .....	Phillip White .....	47.80	Lot 2390, G. 1	23rd Mar., 1898
Wild Swan .....	Ainsworth ..	John Macquillan .....	49.06	" 2512 "	18th June, "
Western Spy .....	Trail Creek ..	Little Joe Consol. Gold Min. Co.	8.74	" 1696 "	10th Aug., "
Western King .....	" .....	Angus McNish .....	46.22	" 1822 "	19th " "
Whirloo .....	" .....	F. McL. McIvor Campbell .....	17.73	" 2118 "	30th " "
Woodside .....	Nelson .....	Alf Gold Mining Co., Ltd. Ly .....	51.43	" 2188 "	" " "
Waffer .....	" .....	Lucky Boy Min. & Dev. Co., Ltd.	51.60	" 2468 "	18th Oct., "
Wakefield Fraction	Slocan .....	W. Kootenay (B. C.) Exploring and Mining Co., Ltd. ....	1.11	" 1810 "	8th Jan., "
W. H. R. ....	" .....	Chas. E. Hope .....	45.30	" 2535 "	13th Oct., "
Willa .....	" .....	Willow Gold Min. Co. (For.) .....	26.86	" 1529 "	16th Nov., "
Wedge Fraction ..	Ainsworth ..	Robt. E. Lee Brown .....	.56	" 2267 "	14th " "
Whoop Up .....	Trail Creek ..	British America Corporation, Ltd.	51.65	" 3324 "	12th Dec., "
Young Grouse .....	Nelson .....	Franklin Riffle .....	49.08	" 2456 "	24th Feb., "
Young American ..	" .....	" .....	51.65	" 2457 "	" " "
X Ray Fraction ..	Ainsworth ..	R. E. Lee Brown .....	27.40	" 2274 "	28th Dec., "
Zuma .....	Slocan .....	The Ruth Mines, Limited .....	40.49	" 2029 "	24th Jan., "
Zuma Fraction ..	" .....	" .....	6.42	" 2037 "	25th " "

## LILLOOET.

Avoca .....	Clinton .....	The B. C. Development Co., Ltd.	51.65	Lot 410, G. 1	2nd Dec., 1898
Avon .....	" .....	" .....	51.65	" 411 "	" " "
Amazon .....	" .....	" .....	50.33	" 412 "	" " "
Ankobra .....	" .....	" .....	46.20	" 413 "	" " "
Atrato .....	" .....	" .....	49.82	" 414 "	" " "
Atarbo .....	" .....	" .....	49.14	" 415 "	" " "
Arkansas .....	" .....	" .....	51.65	" 416 "	" " "
Axim .....	" .....	" .....	51.65	" 417 "	" " "
Alabama Fraction ..	" .....	" .....	29.40	" 418 "	" " "
Athabasa .....	" .....	" .....	18.40	" 419 "	" " "
Assiniboine .....	" .....	" .....	4.05	" 420 "	" " "
Amoor .....	" .....	" .....	6.15	" 421 "	" " "
Blue Pete .....	Lillooet .....	The Golden Eagle Mountain Gold Mining Co., Ltd. ....	51.63	" 407 "	2nd Mar., 1898
Berta .....	" .....	Ceriso A. Phair .....	50.59	" 445 "	19th Aug., "
Eagles Nest .....	" .....	The Golden Eagle Mountain Gold Mining Co., Ltd. ....	34.30	" 407 "	2nd Mar., "
Excelsior .....	" .....	Excelsior Gold Mining Co., Ltd. .	41.27	" 387 "	28th Jan., "
Forty Thieves .....	" .....	R. B. Skinner and J. Marshall ..	47.39	" 443 "	19th Aug., "
Mineral Point .....	" .....	R. H. Verity and Wm. Wilkinson	42.12	" 390 "	29th Dec., "
Ural .....	" .....	R. B. Skinner and J. R. Williams	51.65	" 442 "	19th Aug., "

## YALE.

American Eagle ...	Grand Forks	Jno. Holm and Jno. T. O'Brien..	43.33	Lot 722, G. 1	28th Jan., 1898
Atlas .....	Osoyoos .....	Jno. R. Mitchell .....	50.88	" 664 "	28th Feb., "
Anchor .....	Kettle River.	Geo. D. Leyson .....	51.65	" 1021 "	15th Oct., "
Aetna .....	" .....	Chas. E. Galt .....	24.91	" 978 "	9th Nov., "
August .....	" .....	Jno. Stevens <i>et al</i> .....	12.85	" 1050 "	16th " "
Athelstan Fraction.	Grand Forks	Jno. Mack .....	18.85	" 1065 "	22nd Dec., "

## YALE.—Continued.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Bighorn .....	Osoyoos .....	Tin Horn Quartz Mining Co., Ltd.	51.45	Lot 727, G. 1	28th Jan., 1898
Black Prince .....	" .....	W. A. Dier and A. A. Davidson.	44.97	" 937 "	25th Mar., "
Belmont Fraction .....	" .....	P. C. Stoces .....	11.	" 837 "	29th April, "
Boundary Falls .....	Kettle River	Boundary Falls Mining Co., Ltd.	50.11	" 889 "	21st " "
B. C. ....	Grand Forks	Albert Keough .....	51.65	" 882 "	28th June, "
Big Eddy .....	Kettle River	Ben. Perkins and H. Reed .....	39.50	" 1030 "	28th July, "
Brooklyn .....	" .....	J. M. Taylor <i>et al.</i> .....	20.65	" 796 "	22nd Aug., "
Bonnie Bell .....	" .....	Robert Wood .....	51.18	" 880 "	22nd Oct., "
Blue Jay .....	Vernon .....	Arthur H. Craven .....	51.65	" 738 "	22nd Nov., "
Boneta .....	Osoyoos .....	Boneta Gold Mining Co. (For.) ..	50.17	" 716 "	7th Feb., "
California .....	" .....	Fairview Consol. Gold Mines Co., of Fairview, B. C. ....	51.65	" 547 "	" " "
Capital Prize .....	Kettle River	Jno. Weir <i>et al.</i> .....	36.11	" 914 "	3rd March, "
Coin .....	Grand Forks	Gold Coin Mining Co., Ltd. Ly ..	51.65	" 956 "	18th June, "
Chicamin .....	Osoyoos .....	Adams British Columbia Co., Ltd.	51.65	" 799 "	8th " "
Commonwealth .....	Kettle River	Ben. Perkins and Hugh Reed ..	51.65	" 1029 "	4th Aug., "
Cimeron .....	" .....	Geo. W. Rumberger .....	48.6	" 980 "	16th Nov., "
Curlew .....	Grand Forks	Robert Denzler .....	7.63	" 893 "	27th Dec., "
C. O. D. ....	Kettle River	Wm. L. Hogg .....	49.26	" 928 "	" " "
Columbia .....	Osoyoos .....	Evan Morris .....	51.65	" 857 "	12th Jan., "
Densy .....	Vernon .....	Thos. P. Kempson .....	50.86	" 1051 "	4th Feb., "
Daisy .....	Osoyoos .....	John Robert Mitchell .....	51.60	" 865 "	28th " "
Defiance .....	Kettle River	H. J. Cole and Geo. F. Steele ..	51.65	" 758 "	29th April, "
Diamond Fraction .....	Osoyoos .....	Tin Horn Quartz Mining Co., Ltd.	.66	" 943 "	25th March, "
Denver .....	Kettle River	G. Lavagnino .....	19.85	" 764 "	10th " "
Denero Grande .....	" .....	Mary McArthur and The Pros- pecting Syndicate of B. C., Ltd.	47.51	" 851 "	24th " "
Divide .....	Osoyoos .....	Adams B. C. Co., Ltd. Ly .....	51.65	" 800 "	8th June, "
Exchange .....	" .....	W. A. Dier and A. A. Davidson.	42.30	" 936 "	25th March, "
Enterprise .....	Kettle River	Geo. D. Leyson .....	12.7	" 1022 "	15th Oct., "
Elkhorn .....	Osoyoos .....	C. L. Thomet <i>et al.</i> .....	47.95	" 818 "	26th Jan., "
Fanny Morris .....	" .....	Fairview Consol. Gold Mines, of Fairview, B. C., Ltd .....	51.65	" 544 " } 2 grants.	26th Jan., "
Fortune .....	" .....	Tin Horn Quartz Mining Co., Ltd.	31.	" 940 "	7th Feb., "
Favourite .....	" .....	Thos. Elliott .....	41.60	" 944 "	5th May, "
Fourth of July .....	Kettle River	Jay P. Graves .....	29.	" 922 "	29th April, "
Grey Eagle .....	Grand Forks	Wm. W. Spinks, Wm. Hy. Gee, and Chas. Van Ness.	42.59	" 720 " } 2 grants.	19th Dec., "
Gilpin Fraction .....	Osoyoos .....	Jno. R. Mitchell .....	7.33	" 838 "	11th July, "
Gold Bug .....	Kettle River	Adolph Drucker .....	46.17	" 895 "	19th April, "
Granada .....	" .....	Edwin S. Graham .....	47.30	" 869 "	29th June, "
Gilt Edge .....	" .....	James Marshall .....	49.8	" 977 "	8th " "
Grey Hound .....	" .....	Wm. J. Harris .....	51.65	" 1014 "	4th Aug., "
Garnet .....	Grand Forks	Hy. Geo. Brown .....	31.45	" 785 "	24th Oct., "
Homestake .....	Osoyoos .....	Mance & M. Millar & Ed. Blewitt	.20	" 649 "	10th Nov., "
Hidden Treasure .....	Kettle River	Adolph Drucker .....	10.17	" 896 "	26th Jan., "
Highland Chief .....	Osoyoos .....	Randolph Elmore Quartz Mining & Mill. Co., of Fairview, B. C..	51.65	" 732 "	29th June, "
Hidden Treasure .....	Kettle River	Republic Gold Mining Co. ....	51.48	" 1019 "	8th June, "
Jubilee Fraction .....	Osoyoos .....	Tin Horn Quartz Mining Co., Ltd.	9.27	" 941 "	12th Aug., "
Jumbo .....	Kettle River	Wm. T. Smith & W. G. McMynn	50.59	" 592 "	25th March, "
Jewel .....	" .....	Prospecting Synd. of B. C., Ltd..	51.65	" 850 "	3rd " "
King Bee .....	Grand Forks	Hy. Geo. Brown .....	45.34	" 784 "	24th " "
Lake .....	Kettle River	Wm. A. Corbett .....	51.65	" 765 "	10th Nov., "
Last Chance .....	Osoyoos .....	Stephen Mangott .....	51.65	" 751 "	28th Feb., "
Monte Carlo .....	Grand Forks	J. T. O'Brien and S. M. Kirkham	48.44	" 721 "	3rd March, "

YALE.—*Concluded.*

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Mattie Davies .....	Kettle River	Wm. T. Smith .....	51.65	Lot 795, G. 1	4th March, 1898
Minnie Moor .....	"	" .....	50.12	" 593 "	4th " "
Mountain Rose .....	Grand Forks	" .....	33.	" 794 "	10th " "
Monte Carlo .....	Kettle River	Theo. Roderick .....	51.65	" 976 "	5th Aug., "
Monte Cristo .....	"	Jas. Marshall and Jas. Nicholson	22.09	" 975 "	4th " "
Number Four .....	Grand Forks	Hy. White & May W. Palmerston	17.60	" 791 "	28th Feb., "
New York .....	Kettle River	Jos. B. McArthur .....	47.65	" 1843 "	19th Aug., "
Norfolk .....	"	Jas. Roderick Robertson .....	46.18	" 985 "	10th Nov., "
Nightingale .....	Osoyoos .....	Fairview Consol. Gold Mines Co., of Fairview, B. C., Ltd. ....	43.	" 855 "	21st " "
Osoyoos .....	"	Stephen Mangott .....	18.97	" 762 "	27th Jan., "
Ocean Wave .....	"	Fairview Consol. Gold Mines Co., Ltd., of Fairview, B. C. ....	36.19	" 854 "	26th " "
Orillia .....	"	Tin Horn Quartz Mining Co., Ltd.	50.50	" 935 "	5th May, "
Ontario .....	Grand Forks	Wm. Shaw .....	50.39	" 861 "	20th April "
Powis .....	Osoyoos .....	Hy. Nicholson <i>et al.</i> .....	51.49	" 946 "	29th June, "
Plutonia .....	Kettle River	Thos. F. Wren .....	44.67	" 884 "	22nd Oct., "
Quartz Queen .....	Osoyoos .....	Fairview Consol. Gold Mines Co., of Fairview, B. C., Ltd. ....	22.57	" 549 "	26th Jan., "
Rattler .....	Grand Forks	Hy. White & May W. Palmerston	37.70	" 791 "	28th Feb., "
Riverside .....	Osoyoos .....	Herschell Cohen .....	51.60	" 728 "	28th " "
Reliance .....	"	W. A. Dier and A. A. Davidson.	48.	" 938 "	25th March, "
Riverside .....	Kettle River	Benj. Perkins .....	50.13	" 1031 "	29th July, "
Randolph .....	Osoyoos .....	Randolph Elmore Quartz Min. & Mill. Co., of Fairview, B. C., Ltd.	49.31	" 731 "	8th June, "
Rocky Point .....	"	Wm. L. Nicol <i>et al.</i> .....	42.07	" 802 "	29th " "
Rob Roy .....	"	Fairview Consol. Gold Mines Co., of Fairview, B. C., Ltd. ....	51.65	" 546 "	17th Nov., "
Rob Roy .....	Kettle River	Alex. Wallace .....	51.52	" 1153 "	29th Dec., "
Sailor .....	Osoyoos .....	Charles Deitz .....	42.02	" 766 "	4th March, "
Skylark .....	Kettle River	G. Lavagnino .....	31.84	" 763 "	10th " "
Shamrock .....	Osoyoos .....	The Shamrock Gold Mining Co.	31.73	" 770 "	6th May, "
Silver Bow .....	"	Fairview Consol. Gold Mines Co., of Fairview, B. C., Ltd. ....	20.66	" 730 "	28th April. "
Spotted Horse .....	Kettle River	Boundary Falls Mining Co., Ltd.	45.24	" 887 "	21st " "
Snow Shoe .....	"	Thos. McDonnell <i>et al.</i> .....	51.65	" 891 "	22nd " "
Seattle .....	"	E. P. Davis and L. P. Duff .....	51.65	" 652 "	1st June. "
Sunset .....	Similkameen	R. A. Brown and F. A. Averill.	51.65	" 1077 "	21st Sept. "
Tinhorn .....	Osoyoos .....	Tinhorn Quartz Mining Co., Ltd.	47.	" 726 "	28th Jan., "
Tunnell .....	Kettle River	Lindsay Michael .....	22.66	" 888 "	8th July, "
Teaser .....	Osoyoos .....	Hugh Cameron and M. McCuaig.	41.04	" 951 "	29th June. "
Tenas .....	"	David Leggatt .....	.68	" 650 "	29th " "
Twin .....	Kettle River	John W. H. Wood .....	51.65	" 819 "	21st Oct., "
Toronto .....	"	Thos. F. Wren .....	10.52	" 1013 "	22nd " "
Victoria .....	Kettle River	Jay P. Graves .....	46.60	" 933 "	19th Dec., "
White Swan .....	Osoyoos .....	Fairview Consol. Gold Mines Co., of Fairview, B. C., Ltd. ....	39.	" 548 "	26th Feb., "
Winchester .....	"	Winchester Gold Mines Co., of Fairview, B. C., Ltd. Ly. ....	14.66	[2 grants. 550 "	7th " "
Waneta .....	"	Thos. Elliott .....	51.65	" 945 "	29th April "

## COAST—ALBERNI.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Blackbird.....	Alberni.....	Alberni Gold Devel. Synd., Ld..	51.65	Lot 64, G. 1	3rd Aug., 1898
Barney Barnato...	".....	".....	49.50	" 49 "	29th July, "
Estrella.....	".....	".....	37.	" 76 "	3rd Aug., "
Green Mountain..	".....	James Armstrong.....	51.65	" 96 "	29th Dec., "
Humming Bird....	".....	Alberni Gold Devel. Synd., Ld..	23.	" 63 "	3rd Aug., "
Happy John No. 4.	".....	James Armstrong.....	23.50	" 44 "	29th Dec., "
Last Chance.....	".....	Quadra Mining and Milling Co..	34.01	" 220 "	18th June, "
Ophir.....	".....	".....	44.66	" 221 "	" " "
Regina No. 1.....	".....	Alberni Gold Devel. Synd., Ld..	51.65	" 57 "	3rd Aug., "
Regina No. 2.....	".....	".....	41.56	" 54 "	" " "
Regina No. 3.....	".....	".....	51.65	" 55 "	" " "

## COAST—NANAIMO.

Blue Bells.....	Nanaimo...	Frederick Arm Mining Co., Ld..	51.65	Lot 235, R. 1	18th April, 1898
Cone Fraction....	".....	The B. C. Agency, Ld.....	2.5	" 273 "	11th Feb., "
Commonwealth....	".....	Wm. Whalen.....	20.65	" 277 "	14th June, "
Champion.....	".....	Martin Nash.....	22.50	" 276 "	9th Nov., "
Douglas Pine.....	".....	Dan. Leahy and Edwd. Jackson..	31.02	" 271 "	8th Feb., "
Dashwood.....	".....	Frederick Arm Mining Co., Ld..	44.11	" 248 "	18th April, "
Emperor Fraction..	".....	H. Rhodes.....	16.50	" 227 "	10th March, "
Empress.....	".....	Chas. Coulson <i>et al.</i> .....	44.9	" 279 "	19th Aug., "
Enid.....	".....	W. A. Bauer.....	46.25	" 280 "	6th June, "
Gold Exchange....	".....	The B. C. Agency, Ld.....	14.76	" 272 "	1st Feb., "
Gold Bug.....	".....	Frederick Arm Mining Co., Ld..	40.79	" 240 "	18th April, "
Jubilee Fraction...	".....	H. Rhodes.....	16.33	" 230 "	10th March, "
Julie.....	".....	W. A. Bauer, <i>et al.</i> .....	38.84	" 233 "	6th June, "
Jennie B.....	".....	".....	42.53	" 278 "	7th " "
Nancy Bell.....	".....	A. C. Blair.....	26.77	" 46 Tex	25th Nov., "
Stella.....	".....	W. A. Bauer.....	25.60	" 281, R. 1	6th June, "
Silver Tip.....	".....	A. C. Blair.....	42.64	" 44 Tex	25th Nov., "
Waterloo.....	".....	Harry Rhodes.....	5.55	" 226, R. 1	10th March, "

## COAST—NEW WESTMINSTER.

Providence.....	New West'r.	Providence Min. & Devel. Co., Ld.	41.57	Lot 1737, G. 1	27th Jan., 1898
Silver Bell.....	"	"	51.65	" 1738 "	" " "

## COAST—VICTORIA.

Name of Claim.	District.	Name of Grantee.	Acres.	Description.	Date of Grant.
Herbert .....	Victoria ....	Thos. A. Wood <i>et al.</i> .....	38.02	Lot 20, G. 1	15th Aug., 1898
Tyee .....	" .....	C. Livingstone <i>et al.</i> .....	48.44	" 36 "	25th " "
X. L. ....	" .....	Thos. A. Wood <i>et al.</i> .....	31.	" 9 "	15th " "

## COAST—SKEENA.

Emma Mine .....	Skeena .....	Skeena River Mining Co. ....	50.37	Lot 71, R. 5	8th July, 1898
I. X. L. ....	" .....	" " .....	51.62	" 72 "	8th " "

## DEPARTMENT OF MINES.

Minister of Mines	- - -	HON. J. FRED HUME	- - -	Victoria.
Secretary to the Department,	- - -	M. RICHARDSON	- - -	"
Provincial Mineralogist	- - -	WM. F. ROBERTSON, B. A. SC.	- - -	"
" Assayer	- - -	HERBERT CARMICHAEL	- - -	"
Inspector of Coal Mines	- - -	THOS. MORGAN	- - -	Nanaimo.
" Metalliferous Mines	- - -	JAS. MCGREGOR	- - -	Nelson.

## GOLD COMMISSIONERS AND MINING RECORDERS.

Mining Divisions.	Name of Recorder.	Address.	Name of Gold Commissioner.	Address.
<b>Cariboo—</b>				
Omineca .....	John Bowron	Barkerville	John Bowron	Barkerville.
Richfield .....	"	"		
Quesnelle .....	W. Stephenson	Quesnelle Forks	F. W. Valleau	Manson Creek.
Omineca (Land Rec'd'g D).	F. W. Valleau	Manson Creek		
" (sub office) .....	Ralph Grassham	Fort St. James		
<b>Cassiar, etc.—</b>				
Stickine .....	James Porter	Telegraph Creek	James Porter	Telegraph Creek.
Liard .....	"	"		
McDane .....	"	"		
Laketon .....	"	"		
Teslin Lake .....	"	"	J. D. Graham	Atlin City.
Bennett Lake .....	W. J. Rant	Lake Bennett		
Atlin Lake .....	W. G. Paxton	Atlin City	W. S. Gore	Victoria.
Skeena .....	John Flewin	Fort Simpson		
" (sub office) .....	R. S. Sargent	Skeena		
<b>East Kootenay—</b>				
Donald .....	J. Stirret	Donald	J. E. Griffith	Donald.
Golden .....	F. C. Lang	Golden		
Windermere .....	G. Goldie	Windermere	J. F. Armstrong	Fort Steele.
Fort Steele .....	C. M. Edwards	Fort Steele		
" (sub office) .....	M. Phillipps	Tobacco Plains		
<b>West Kootenay—</b>				
Revelstoke .....	F. Fraser	Revelstoke	H. N. Coursier	Revelstoke.
Illecillewaet .....	W. Scott	Illecillewaet		
Lardeau .....	Geo. Summer	Comaplix	A. Sproat	New Denver.
Trout Lake .....	Thos. Taylor	Trout Lake		
Slocan .....	Angus McInnes	New Denver	J. A. Turner	Nelson.
Slocan City .....	H. P. Christie	Slocan City		
Ainsworth .....	John Keen	Kaslo	J. Kirkup	Rossland.
Nelson .....	D. A. McBeath	Nelson		
Goat River .....	J. C. Rykert	Rykerts		
Arrow Lake .....	F. G. Fauquier	Nakusp		
Trail Creek .....	H. R. Townsend	Rossland		
<b>Lillooet—</b>				
Clinton .....	F. Soues	Clinton	F. Soues	Clinton.
Lillooet .....	C. A. Phair	Lillooet		
<b>Yale—</b>				
Kamloops .....	Martin Beattie	Kamloops	G. C. Tunstall	Kamloops.
Yale .....	Wm. Dodd	Yale		
Similkameen .....	H. Hunter	Granite Creek	Leonard Norris	Vernon.
Vernon .....	J. C. Tunstall	Vernon		
Osoyoos .....	J. R. Brown	Fairview	C. A. R. Lambly	Fairview.
Kettle River .....	W. G. McMynn	Midway		
Grand Forks .....	S. R. Almond	Grand Forks		
<b>Alberni—</b>				
Alberni Mining Division.	Thos. Fletcher	Alberni	Thos. Fletcher	Alberni.
West Coast, V. I. M. D.	W. T. Dawley	Clayoquot		
<b>Nanaimo—</b>				
Nanaimo Mining Division.	M. Bray	Nanaimo	M. Bray	Nanaimo.
<b>Victoria—</b>				
New Westminster .....	D. Robson	New Westminster.	W. S. Gore	Victoria.
" (sub office) .....	L. A. Agassiz	Harrison Lake		
Victoria .....	W. S. Gore	Victoria		



PUBLICATIONS AND MAPS RELATING TO GEOLOGY AND MINING  
IN THE PROVINCE.

—o—

PUBLICATIONS BY GOVERNMENT OF BRITISH COLUMBIA.

**Report of Minister of Mines for 1896**, including Index Map of British Columbia and map of West Division of Kootenay District and a portion of Lillooet, Yale, and East Kootenay. Price, 50 cents.

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Map of B. C., 2 sheets (latest) .....	\$1 00 each.	\$6 00 per dozen.
" " (Brownlee's) .....	10 "	1 00 "
" " (small) .....	10 "	1 00 "
" " (mining divisions) .....	10 "	1 00 "
" Kootenay, E. (mineral monuments) .....	10 "	1 00 "
" " E. and W. (southern portion) .....	20 "	2 00 "
" " W. (mining divisions) .....	10 "	1 00 "
" " W., part of (topographical) .....	1 00 "	6 00 "
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" Osoyoos District .....	10 "	1 00 "
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" Cariboo and Omenica .....	10 "	1 00 "
" " (central part) .....	10 "	1 00 "
" B. C., south-west portion .....	10 "	1 00 "
" " north coast and Q. C. Islands .....	10 "	1 00 "
" Vancouver Island, west coast .....	10 "	1 00 "
" " (south-eastern districts) .....	10 "	1 00 "
" " San Juan and Gordon Rivers..	10 "	50 "
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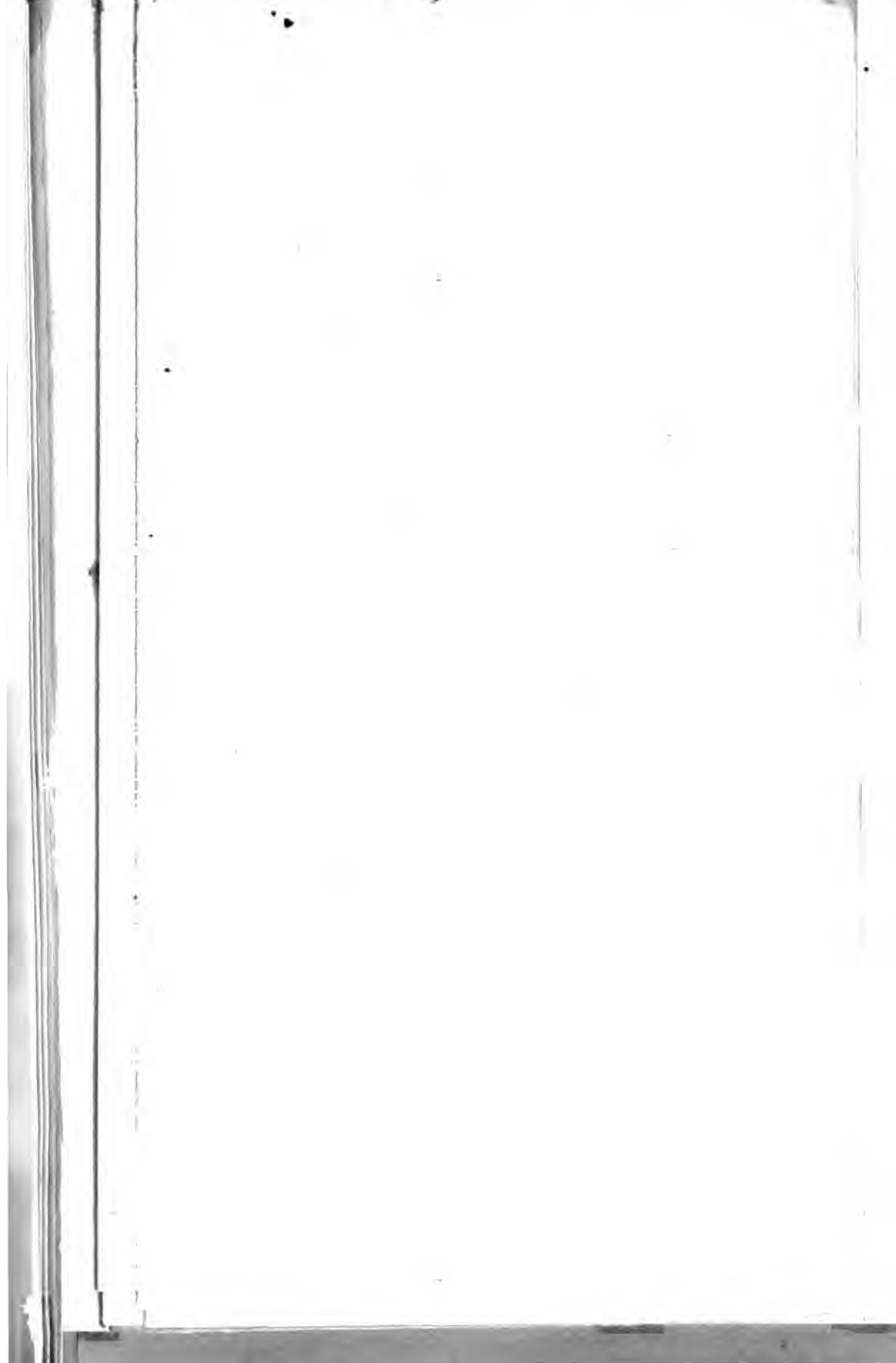
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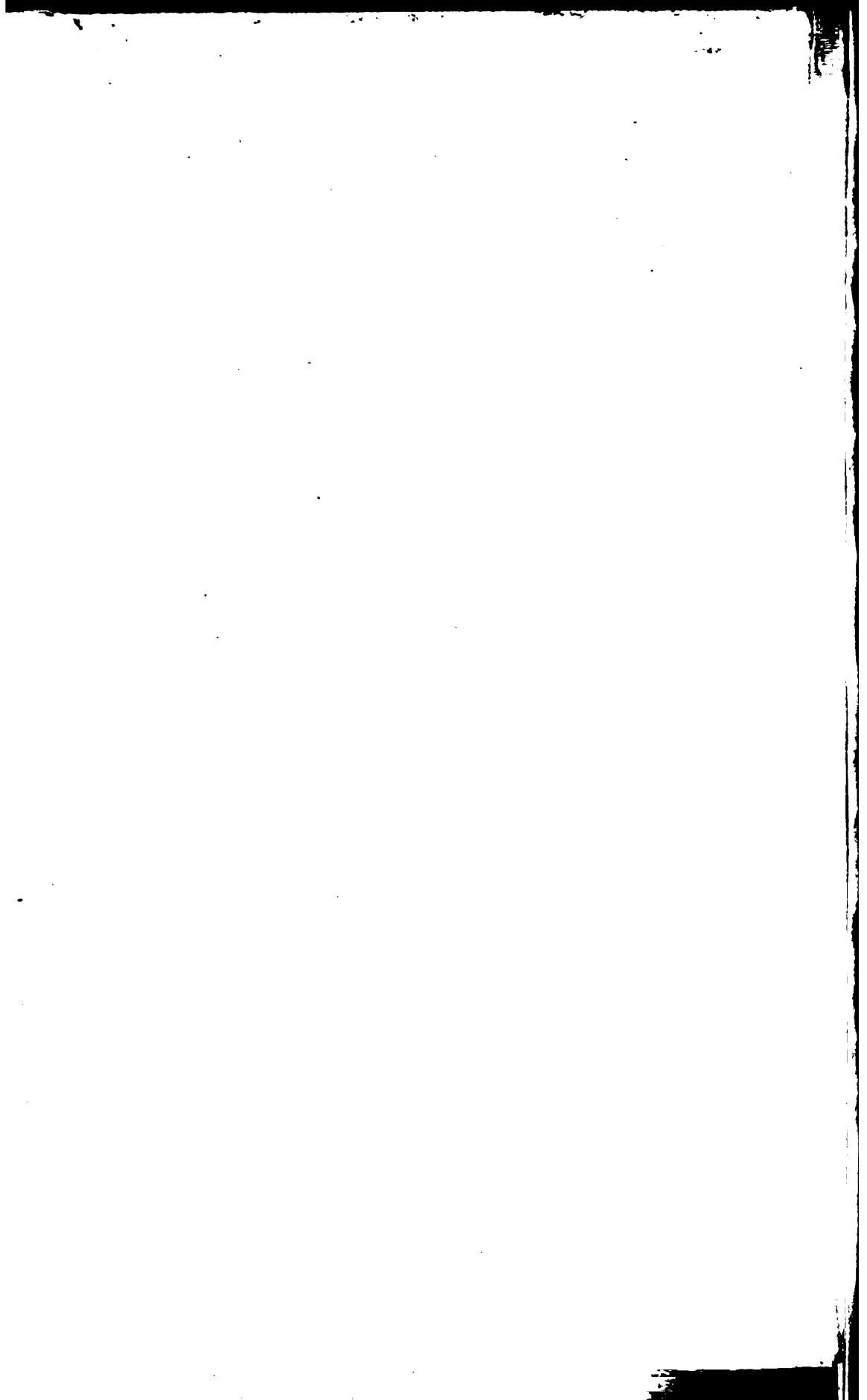
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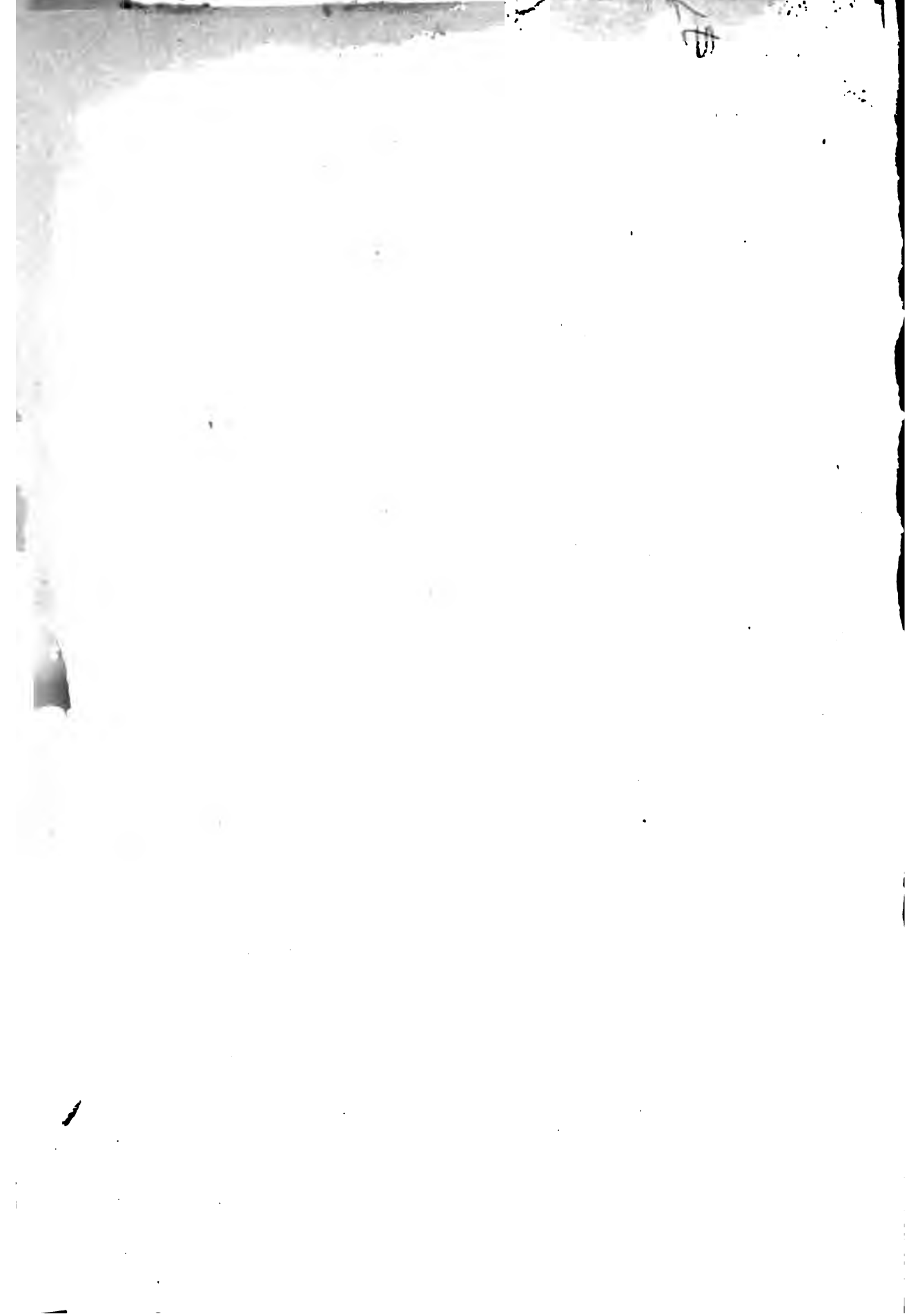
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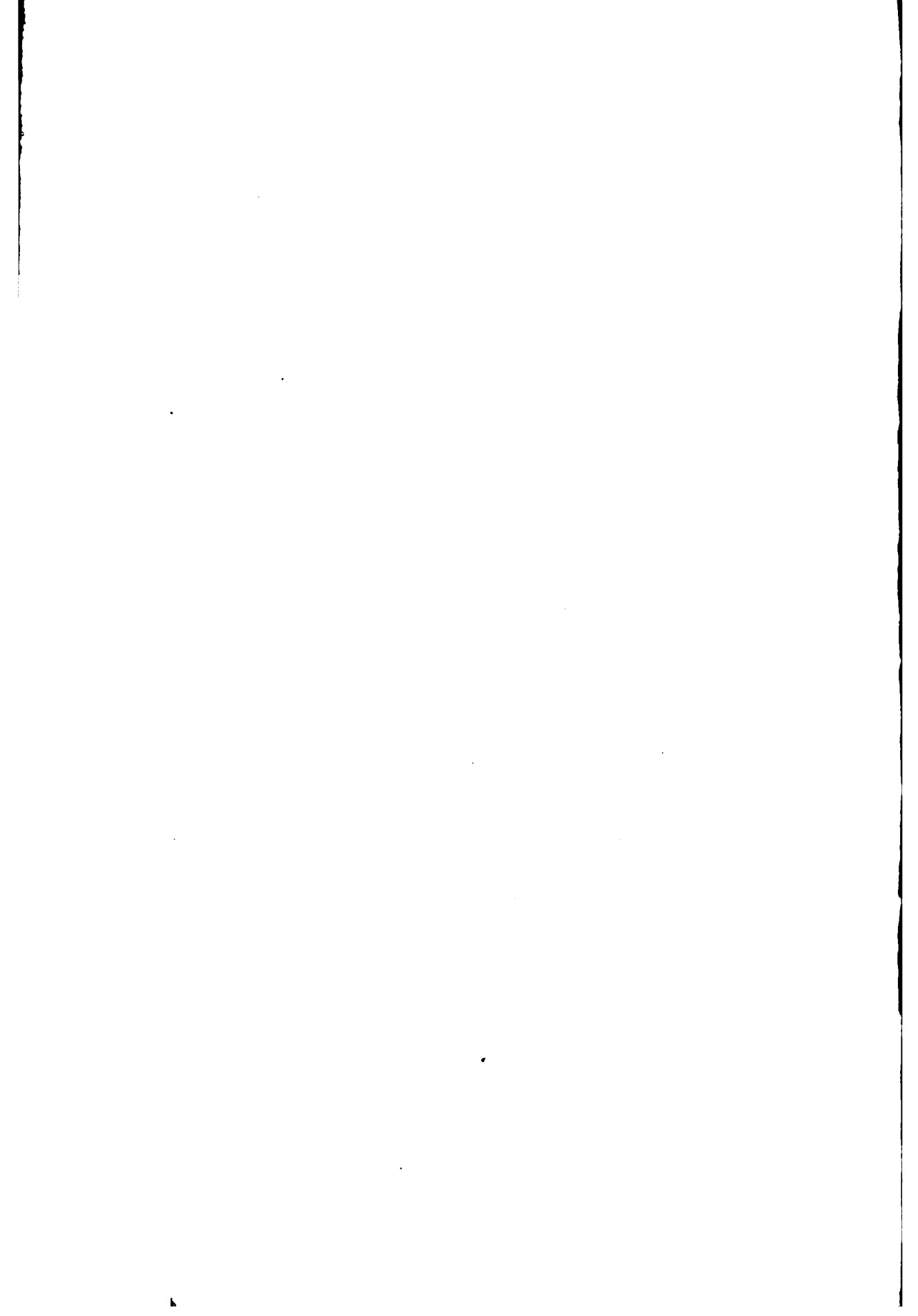














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